2007

Report of the Fraser River Panel to the Pacific Salmon Commission on the 2007 Fraser River Sockeye and Pink Salmon Fishing Season

Prepared by the

Pacific Salmon Commission

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REPORT OF THE
FRASER RIVER PANEL
TO THE PACIFIC SALMON COMMISSION
ON THE 2007 FRASER RIVER SOCKEYE
AND PINK SALMON FISHING SEASON

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I. EXECUTIVE SUMMARY

Pre-season Planning

1. Prior to the season, a median abundance of 6.2 million Fraser River sockeye salmon (Table 1) and a Johnstone Strait diversion rate of 32% were expected. The forecasted 50% migration dates (relative to Area 20) for Early Stuart, Early Summer, Summer and Late-run sockeye salmon were July 1, July 31, August 8 and August 16, respectively. The median forecast abundance of Fraser River pink salmon was 19.6 million fish, with an Area 20 50% migration date of August 29.

2. Pre-season spawning escapement goals established by Canada's Spawning Escapement Plan were 45,000 Early Stuart, 276,000 Early Summer, 1.3 million Summer, 245,000 Birkenhead and 612,000 Late-run sockeye, for a total of 2.5 million spawners (Table 1). Management Adjustments (MAs) were added to the Early Stuart and Early Summer spawning escapement targets to increase the likelihood of achieving the targets. The MAs were based on relationships between river conditions (discharge and temperature) as they relate to historic differences (DBEs) between in-season and post-season escapement estimates. The escapement target for Fraser pink salmon was 6.0 million fish.

3. For Late-run sockeye, the Panel assumed a continuation of the early upstream migration behaviour and associated high mortality that has occurred since 1996. The Panel adopted a flexible approach to the management of Late-run sockeye by combining Canada's Spawning Escapement Plan (see point 2, above) with a Management Adjustment (MA) based the historic relationship between upstream migration timing and DBE (Table 1). The Panel assumed a DBE of 42.5% based on the midpoint of the average difference between estimates for the years 1998, 1999, 2002 and 2003 (37%) and the predicted DBE from the Management Adjustment model (48%) using the assumed upstream migration date of August 29. The MA model included 2006-2007 cycle line data (i.e., Adams dominant cycle lines), but excluded the 2006 data point because of concerns it was not representative of the relationship. For pre-season planning purposes, this generated a predicted MA of 453,000 fish and resulted in a Late-run exploitation rate target of 31%. Late-run escapement and catch targets were expected to change during the in-season management period as return abundances and MAs were updated. For Canadian fisheries, the exploitation rate on Late-run Cultus sockeye was further constrained to 20% to meet conservation needs.

4. The projected Total Allowable Catch (TAC) of Fraser River sockeye salmon (Table 1) was 2.7 million fish, of which 16.5% (448,000 fish) was the United States share. The projected TAC of Fraser River pink salmon (Table 1) was 13.6 million fish, of which 25.7% (3.5 million fish) was allocated to the United States. There were no paybacks owed for either species from previous years.

5. Pre-season modeling showed it was unlikely the available Summer-run TAC could be harvested, due to constraints required in order to meet spawning escapement targets for co-migrating Early Summer and Late-run stocks.

6. The Panel adopted a management plan and fishery regime before the fishing season, including the Principles and Constraints, Guidelines to Address Late Run Concerns, Panel Management Process and Regulations(Appendices C through F).

In-season Management Considerations

7. Abundances of Fraser sockeye were substantially below the forecasts for all management groups, resulting in complete closures of sockeye-directed commercial fisheries in both countries. Migration timing of sockeye salmon was as predicted with the exception of Early Summer-run sockeye, for which the observed 50% date in Area 20 was 5 days later than expected (Figure 3). Fraser pink salmon arrived almost a week earlier than expected and substantially below the forecast abundance (Figure 4). Directed pink fisheries were severely

limited due to overlap with the Late-run sockeye migration and restrictions to protect that group.

8. With the exception of Early Stuart sockeye which experienced higher than average flows, most Fraser River sockeye salmon were exposed to near average temperature and flow conditions during their upstream migration (Figure 6). As a consequence, in-season MA factors for Early Stuart, Early Summer and Summer-run stocks decreased relative to pre-season expectations. In-season indications of an earlier than expected in-river migration of Late-run sockeye (August 27), resulted in a slight increase to the MA factor for that group.

Run Size, Catch and Escapement

9. Returns of adult Fraser sockeye totalled 1.5 million fish (Tables 9 and 10), which was only 24% of the median pre-season forecast and the lowest Fraser sockeye return since 1947 (60 years, Figure 7). These returns also represented the lowest returns per spawner on record for Fraser sockeye. Divided into management groups, adult returns totalled 13,000 Early Stuart, 195,000 Early Summer, 637,000 Summer, 143,000 Birkenhead and 522,000 Late-run sockeye. All management groups showed poor returns, ranging from 19% to 34% of the median pre-season abundance forecasts. The marine survival of Chilko sockeye was only 1.4%, the lowest observed since the 1957 brood (return year 1961). Similar poor returns of other stocks and species throughout the Pacific northwest suggests the likely cause was very low marine survival of salmon that entered the ocean as juveniles in 2005. The ocean was extremely warm in 2005, which limited productivity and food for young salmon. The total return of Fraser River pink salmon was 11,000,000 fish, or 56% of the median forecast. Unlike sockeye salmon, pink salmon that returned in 2007 entered the ocean in 2006 and thus were not impacted by the poor ocean conditions in 2005.

10. Catches of Fraser River sockeye salmon in all fisheries totalled 376,000 fish, including 199,000 fish caught by Canada, 142,000 fish by the United States and 35,000 fish by test fisheries (Table 9). The Canadian catch included 197,000 fish in First Nations, 200 fish in recreational and 2,100 fish in ESSR fisheries (Excess Salmon to Spawning Requirements), but none in commercial fisheries. In Washington, Treaty Indian fishers landed an incidental ceremonial harvest of 3,400 sockeye in fisheries directed at Fraser River pink salmon. There was no sockeye harvest by All Citizen fishers. A harvest of 139,000 Fraser sockeye in Alaska constituted 9% of the total run, which is a much larger proportion than the historical average of 1% since 1985.

11. Catches of Fraser River pink salmon in all fisheries totalled 840,000 fish, including 406,000 fish caught by Canada, 395,000 fish by the United States and 39,000 fish by test fisheries (Table 9). The Canadian catch included 1,900 fish in commercial, 327,000 fish in First Nations and 77,000 fish in recreational fisheries. In Washington, Treaty Indian fishers harvested 210,000 fish, All Citizen fishers harvested 158,000 fish and there was a recreational catch of 27,000 fish.

12. DFO's estimates of spawning escapements to streams in the Fraser River watershed totalled 887,000 adult sockeye (Tables 9 and 10). This escapement was 55% lower than the brood year (2003) escapement of 2.0 million adults, and was the lowest escapement on the cycle since 1971. Compared to the brood year, spawning escapements were 59% lower for Early Stuart, 36% lower for Early Summer, 57% lower for Summer, 70% lower for Birkenhead and 49% lower for Late-run stocks (Figure 10). Spawning success of female sockeye in the Fraser watershed averaged 96%.

13. DFO has not conducted field programs to estimate the abundance of Fraser River pink salmon spawners since 2001. Pink salmon escapement (10.2 million fish) was therefore estimated by subtracting the total catch in all fisheries (840,000 fish) from the total abundance estimated in-season from test fishery data (11.0 million fish).

14. The annual diversion rate through Johnstone Strait was 45% for Fraser sockeye and 40% for pink salmon (Figure 5).

Achievement of Objectives

15. In order of descending priority, the goals of the Panel are to achieve the targets for spawning escapement, international sharing of the TAC and domestic catch allocation.

16. In-season management decisions are based on potential spawning escapement targets (i.e., spawning escapement targets plus MAs). In-season estimates of potential escapement (i.e., Mission escapement minus First Nations and recreational catches above Mission) were lower than the targets for Early Stuart (8% under), Early Summer (14% under), Summer (20% under) and Late-run sockeye (12% under), but slightly higher than the target for Birkenhead (11% over, Table 13). These results are mainly due to reductions in Summer and Late-run abundance estimates after most First Nations fisheries were complete.

17. Spawning escapement objectives are assessed by comparing spawning ground abundance estimates with targets calculated by applying Canada's Spawning Escapement Plan to post-season estimates of run size. Upriver estimates of spawning escapement were substantially below post-season targets for all sockeye management groups: Early Stuart – 59% under, Early Summers – 29% under, Summers – 28% under, Birkenhead – 27% under and Lates – 45% under (Table 14). In total, spawning ground estimates were 450,000 fish or 34% below the target. There are a number of causes for this result. For Early Stuart sockeye the spawning escapement target was essentially the entire run and the catch was minimal (1,000 fish), so the shortfall was due to the run size being too low given the -55% DBE experienced by this stock (Table 7). The observed DBE was similar to the prediction by the in-season MA model (-51%), so the number of Early Stuart fish that arrived on the spawning grounds was close to what was expected. The situation was similar for Late-run sockeye, i.e., the run-size was too small to achieve the spawning escapement target given the observed -49% DBE. For the Late run, however, an added component was that catches exceeded the available harvest, primarily in Canadian First Nations fisheries. For Early Summer and Summer-run sockeye the escapement shortfalls are mainly attributable to catches that exceeded the available harvests, with probable en route losses an additional factor for the Early Summer run and larger than expected %DBEs a factor for the Summer run.

18. The escapement of pink salmon was 69% above the target of 6,000,000 fish (Table 14). Fisheries on pink salmon were restricted due to conservation concerns for sockeye salmon in general and Late-run sockeye in particular.

19. The exploitation rate for Cultus Lake sockeye was 15% (Table 10), which was less than the Canadian exploitation rate limit of 20% for this stock.

20. Based on the TAC calculation method set out in Annex IV, Chapter 4 of the Pacific Salmon Treaty, by the end of the season there was no Fraser sockeye TAC available (Table 15). The small harvests in Canadian and Washington State waters represent either by-catch during fisheries directed at other species or harvest taken before declining in-season run-size estimates reduced fishery opportunities. In this calculation, the allowable catch is fixed on the date that Panel control of the last U.S. Panel Area was relinquished (September 21 in 2007), while catches are the post-season accounted totals. The small overage of 3,400 sockeye in the United States (Washington) was due to sockeye by-catch in commercial pink-directed Treaty Indian fisheries. These sockeye were not sold, however, and were used for C&S purposes (Ceremonial and Subsistence). The entire Canadian First Nations catch of 197,000 Fraser sockeye was applied as the Aboriginal Fishery Exemption in the TAC calculation, with the result that Canada's deviation from their share was zero. Catches of Fraser River pink salmon were substantially below target levels in both countries. Fraser pink salmon catches were constrained by conservation measures necessary to protect Late-run sockeye.

21. In terms of domestic allocation goals for Fraser sockeye, the sockeye salmon caught in United States Panel Areas was attributed entirely to Treaty Indian fishers.

22. There was no commercial allocation and no commercial catch of Fraser sockeye in Canada.

23. Treaty Indian and All Citizen fishers, respectively, caught 432,000 and 458,000 fish less than their shares of the U.S. TAC of Fraser River pink salmon (Table 16).

24. The commercial catch of Fraser pinks in Canada was only 1,900 fish, with 97% of these caught in Areas H and G troll fisheries and the remainder in Area B seine and Area D gillnet fisheries.

25. By-catches of non-Fraser sockeye and pink salmon in commercial fisheries regulated by the Fraser River Panel totalled zero sockeye and 91,000 pink salmon in 2007 (Table 17). Catches of other Fraser and non-Fraser salmon species included 2,700 chinook, 590 coho, 4 chum and no steelhead.

Allocation Status

26. By Panel agreement, the United States carried a payback of 3,400 sockeye forward to the 2008 season (Table 18).

II. FRASER RIVER PANEL

In 2007, the Panel operated under the terms of Annex IV, Chapter 4 of the Pacific Salmon Treaty between Canada and the United States (U.S.) and the "Commission Guidance to the Fraser River Panel", as revised in February 2005[1]. The Fraser River Panel is responsible for in-season management of commercial fisheries that target Fraser River sockeye and pink salmon within the Panel Area (Figure 1), including net fisheries in both countries and the Canadian troll fishery in the Strait of Georgia. Coordination of directed harvest of other salmon species and stocks intercepted in south coast areas is the responsibility of the Southern Panel and the Pacific Salmon Commission (PSC). Regulation of Southern Panel related fisheries is the responsibility of the appropriate agencies in each country.

Prior to the fishing season, the Fraser River Panel recommends a fishery regime and a management plan for Panel Area fisheries to the Pacific Salmon Commission (PSC). The plan is based on: (1) abundance, timing and migration route forecasts and escapement targets for Fraser River sockeye and pink salmon provided by Canada's Department of Fisheries and Oceans (DFO); (2) international catch allocation goals set by the Treaty; (3) domestic catch allocation goals established by each country; (4) management concerns for other stocks and species also identified by each country; and (5) historic patterns in migration and fisheries dynamics. In descending priority, the objectives that guide the Panel's decision-making are to: (1) achieve the spawning escapement targets, (2) meet international catch allocation goals, and (3) meet domestic catch allocation objectives. Conservation concerns for other species and stocks that may occur as by-catch in fisheries directed at Fraser sockeye and pink salmon are generally addressed domestically with some international coordination.

All fisheries under Panel regulatory control are closed unless opened by the Panel (Appendix F). The pre-season management plan identifies the approximate pattern of fishery openings required to achieve the Panel objectives given pre-season expectations. However, the Panel typically deviates from this template and determines the actual pattern of fishery openings based on in-season assessments by PSC staff (Staff, Appendix J) of sockeye and pink salmon run size, migration timing and route, in-river migration abundance (Mission passage) and management adjustments. Thus, the Panel responds to deviations from pre-season expectations in their weekly fishing plans and most substantive fishing decisions are based on in-season rather than pre-season assessments. The Fraser River Panel Technical Committee (Appendix K) works in conjunction with Staff to facilitate Panel activities by providing their respective National sections with technical advice and ensuring timely exchange of data between Staff and the Parties.

[1] Pacific Salmon Commission. 2009. Report of the Fraser River Panel to the Pacific Salmon Commission on the 2005 Fraser River sockeye and pink salmon fishing season. Appendices A and B. Vancouver, B.C.

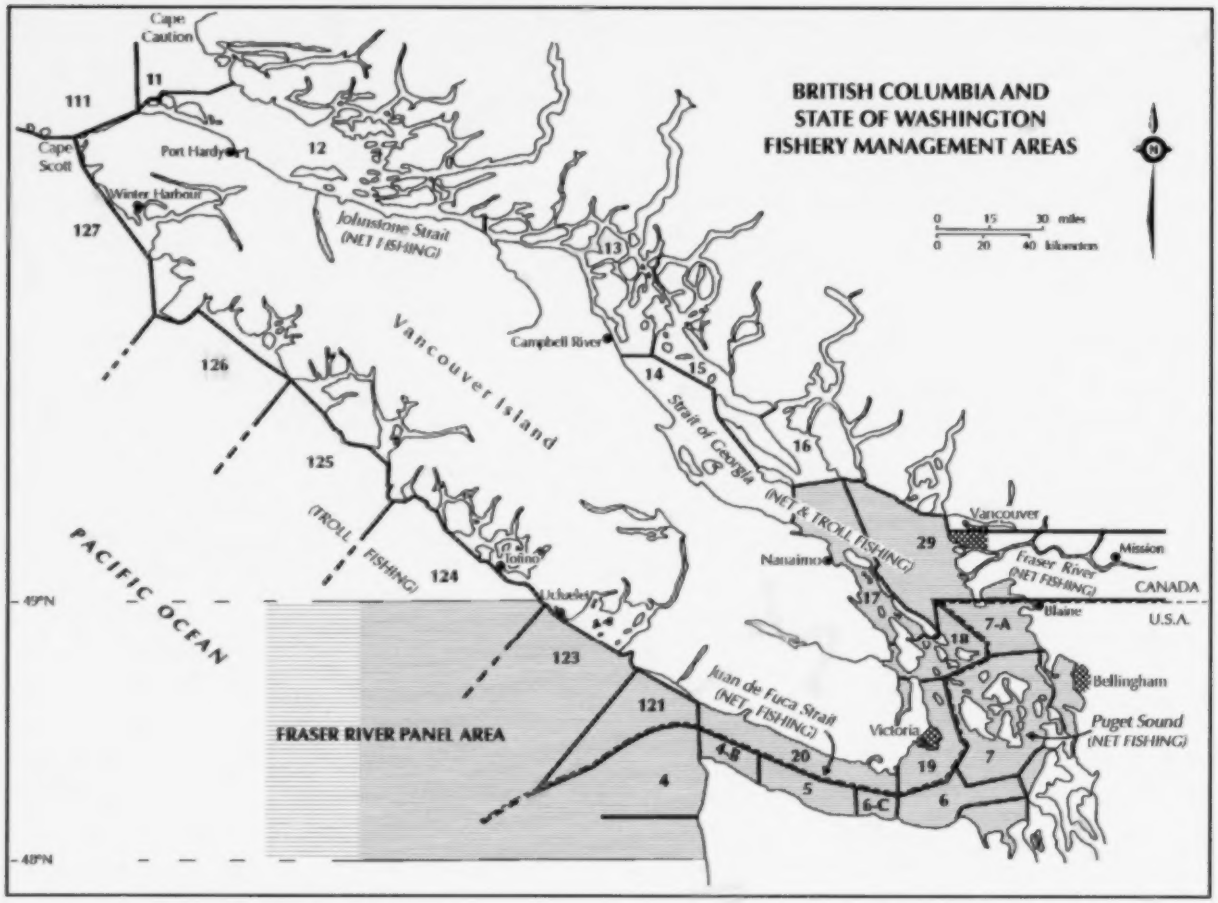

Figure 1. Fishery management areas and commercial gear used in the Fraser River Panel Area and Canadian south coast waters.

III. PANEL MANAGEMENT ACTIVITIES

In 2007, the pre-season fishing plan focused on the harvest of Fraser River Summer-run sockeye while providing protection for Late-run stocks. Other significant management issues included moderating marine catches of Early Summer sockeye to provide for their spawning escapement requirements and to ensure that Canada's in-river harvest obligations to First Nations were met. For Fraser River pink salmon, the primary challenge was to provide fishers with harvest opportunities for pink salmon within the constraints required to protect Late-run sockeye stocks. The median sockeye forecast of 6.2 million fish was slightly higher than the long-term (1963-2003) cycle year average of 6.0 million fish, while the median pink salmon forecast of 19.6 million fish was above the average of 15.0 million fish in recent years (1977-2005).

The likely continuation of early upstream migration behaviour of Late-run sockeye and associated en route migration loss was addressed in the pre-season management plan developed by the Panel. In 2007, the management approach for Late-run sockeye was slightly different than most recent years, such that the Panel expected to have some in-season capability to monitor the abundance, marine migration timing and possibly the upstream migration timing of Late-run stocks while still under active management. This provided the opportunity for a flexible approach in managing Late-run stocks. In response, Canada provided an escapement plan for all Fraser sockeye stocks including Late-run sockeye, in which exploitation rates varied with different levels of abundance. For Canadian fisheries, additional constraints to protect Cultus Lake sockeye were expected. With the forecasts and escapement plans that were adopted for 2007, the pre-season

management plan showed that significant harvests of both Summer and Late-run stocks were available. The need to protect Late-run sockeye was expected to constrain the harvest of pink salmon.

A. Pre-season Planning

Canada presented the Panel with preliminary abundance forecasts for Fraser River sockeye salmon in January, and in April provided final forecasts that the runs would exceed different abundance levels (Appendix B, Table 1) with specific probabilities (10%, 25%, 50%, 75% and 90%). For planning purposes the Panel used the median (i.e., 50% probability level) forecasts of 6.2 million Fraser River sockeye and 19.6 million Fraser River pink salmon (Table 1). Using a median forecast, there exists an equal probability that the actual abundance would be lower or higher than the forecast.

Canada reviewed the results of the Spawning Escapement Initiative in April, including a recommended approach for establishing spawning escapement objectives for 2007 (Appendix B, Table 2). DFO recommended the use of Total Allowable Mortality (TAM) rules[2] to generate spawning escapement targets for all management groups, but noted that additional domestic consultation was required before a final escapement plan would be approved. The proposed escapement targets for Fraser River sockeye were: Early Stuart – 45,000 fish, Early Summer – 276,000 fish, Summer – 1.3 million fish, Birkenhead – 245,000 fish and Late-run sockeye – 612,000 fish (Table 1). The spawning escapement target for Fraser River pink salmon was 6.0 million fish (Table 1).

Table 1. Pre-season forecasts of total run, spawning escapement target and other deductions, and total allowable catch of Fraser River sockeye and pink salmon in 2007.

		Deductions				
Management Group	Forecast Abundance (median)	Spawning Escapement Target	Management Adjustment	Test Fishery	Aboriginal Fishery Exemption	Total Allowable Catch [1]
Sockeye Salmon						
Early Stuart	45,000	45,000	86,000	500	0	0
Early Summer	690,000	276,000	89,000	10,000	42,800	272,000
Summer	3,369,000	1,348,000	0	40,000	269,600	1,711,000
Birkenhead	613,000	245,000	0	3,500	16,300	348,000
Late	1,530,000	612,000	453,000	10,000	71,300	384,000
Total	6,247,000	2,526,000	628,000	64,000	400,000	2,716,000
Pink Salmon						
Total	19,570,000	6,000,000	n/a	0	n/a	13,570,000

1 If the total deductions exceed the run size, then the TAC is set to zero.

DFO's Environmental Watch Program provided the Panel with pre-season projections of Fraser River discharge and temperature based on snowpack data. Fraser River discharge was projected to be higher than normal for Early Stuart, Early Summer and Summer-run management groups due to above average snowfall accumulations in the Fraser River watershed. Based on projected river conditions during each group's migration period, Management Adjustment (MA) models were used to generate pre-season predictions of MA factors for Early Stuart (1.92), Early Summer (0.32 for the entire group including Pitt) and Summer-run sockeye (zero, Table 2). These were adopted by the Panel for pre-season planning purposes. The Panel also adopted a Late-run MA factor of 0.74, which was derived by combining a MA model prediction (assuming a 50% Mission date of August 29) with the average observed difference between estimates (DBEs) for the recent dominant and sub-dominant cycle years (1998, 1999, 2002 and 2003). This Late-run MA factor was equivalent to a 43% DBE, which was consistent with en route mortality estimates

[2] Pestal, G, Ryall, P., and Cass, A. 2008. Collaborative Development of Escapement Strategies for Fraser River Sockeye: Summary Report 2003 – 2008. Can. Man. Rep. Fish. Aquat. Sci. 2855: viii + 84 p.

from Late-run tagging studies in 2002 and 2003. Data from 2006 were excluded from these analyses due to concerns that it was not representative, as evidenced by the extensive post-season review [3] that was conducted to resolve conflicting estimates in 2006. The numerical MAs calculated from the spawning escapement targets and MA factors are shown in Table 1.

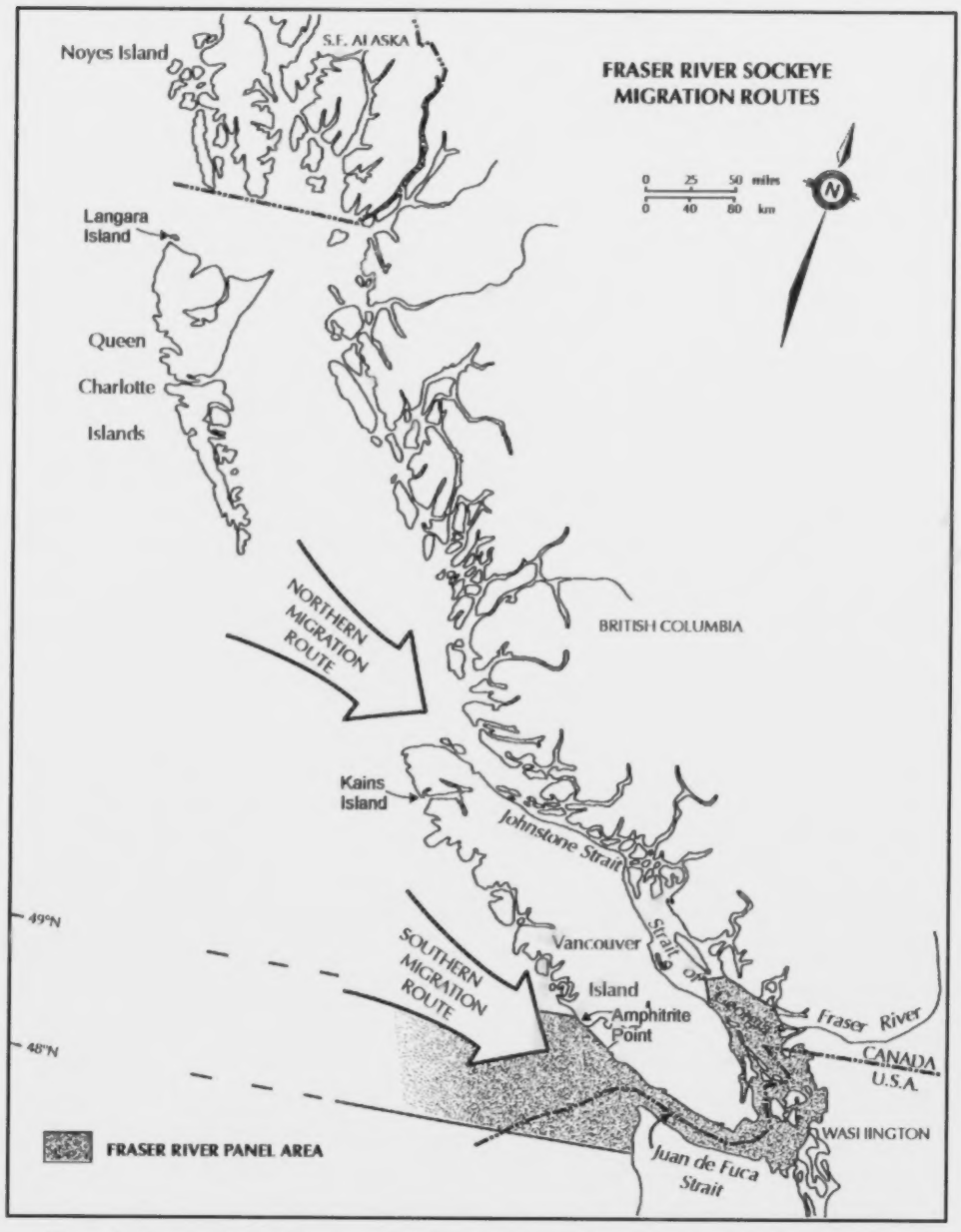

Figure 2. The northern (Johnstone Strait) and southern (Juan de Fuca Strait) routes for sockeye and pink salmon migrating to the Fraser River.

[3] Pacific Salmon Commission. 2011. Report of the Fraser River Panel to the Pacific Salmon Commission on the 2006 Fraser River sockeye salmon fishing season. Appendix I. Vancouver, B.C.

Pre-season expectations of migration parameters included a 32% diversion rate of Fraser River sockeye through Johnstone Strait (Figures 2 and 5, forecast provided by DFO), and Area 20 50% migration dates of July 1 for Early Stuart, July 31 for Early Summers, August 8 for Summers, August 15 for Birkenhead, August 16 for Late-run sockeye and August 29 for pink salmon (Table 2). These dates were based on historical averages and on DFO forecasts of Early Stuart and Chilko timing. Area 20 dates are indices of marine migration timing and represent the date when 50% of the total run would have entered Juan de Fuca Strait (Canadian Area 20) if the entire run had migrated via that route. Projected daily abundances generated from these dates are shown in Figures 3 and 4.

TAC and international harvest shares in 2007 were to be calculated according to Annex IV, Chapter 4 of the Pacific Salmon Treaty and the "Commission Guidance to the Fraser River Panel", as revised in February 2005[1]. Pre-season TAC projections based on median forecast abundances are shown in Table 1. U.S. (Washington) shares of the Total Allowable Catch (TAC) of Fraser River sockeye and pink salmon were 16.5% and 25.7%, respectively, or 448,000 sockeye and 3.5 million pink salmon based on the pre-season TACs.

In terms of domestic goals, Treaty Indian fishers were allocated 67.7% and All Citizen fishers the remaining 32.3% of the U.S. share of Fraser sockeye. The U.S. share of Fraser pinks was to be shared equally between Treaty Indian and All Citizen fishers.

Within non-commercial sectors in Canada, pre-season catch targets for sockeye were 749,000 fish for in-river First Nations and 260,000 fish for marine First Nations, plus projected recreational catches of 100,000 fish in the river and 10,000 fish in marine areas for a total non-commercial catch of 1.1 million fish. In the commercial sector the target of 1.5 million fish was divided as follows: 47.5% for Area B purse seines, 18.5% for Area D gillnets, 22.0% for Area E gillnets and 12% for Area H trollers. Commercial allocations of pink salmon were 70% for Area B purse seines, 4% for Area G gillnets, 1% for Area E gillnets, 12% for Area G trollers and 13% for Area H trollers.

Pre-season management plans for Panel Area fisheries were developed by the Panel using the Fishery Simulation Model [4]. This model helps the Panel to evaluate the impacts of various fishery options on the achievement of management objectives. Inputs into the model include the forecast abundances, migration timing, diversion rates and management adjustments, plus the objectives for spawning escapement and catch allocation described above. To model Late-run impacts, August 29 was adopted as the 50% upstream migration date past Mission based on the average Late-run marine (Area 20) timing on the 2006 and 2007 cycle lines (August 16) combined with the average Late-run travel time plus delay in the Strait of Georgia from 2000 to 2006 (13 days).

As in other years with significant Late-run conservation concerns, simulation modeling focused on the harvest of Summer-run sockeye while protecting weaker co-migrating Early Summer and Late-run stocks. Harvest constraints on Summer-run stocks were expected to be less severe than in recent years because of the relatively large forecast of Late-run sockeye abundance in combination with the use of a spawning escapement plan to determine Late-run harvest rates (i.e., allowable harvest rate would increase as run size increased). The use of an escapement plan to establish catch goals differs from recent years when Late-run exploitation rate limits of 15% to 30% were applied.

The Panel adopted a management plan in June, which included the "Management Plan Principles and Constraints", "Guidelines to Address Late Run Concerns", "2007 Fraser Panel Management Process" and "2007 Regulations" (Appendices C, D, E and F). In the pre-season plan, low impact fisheries in both U.S. and Canadian Panel Areas were expected to start the week of July 22 – 28. If in-season assessments indicated that return abundances of Early Summer or Summer-run sockeye were lower than forecast or the return timing of Fraser stocks was significantly different than forecast, then the commencement and duration of fisheries could deviate from the plan.

[4] Cave, J.D. and W.J. Gazey. 1994. A pre-season simulation model for fisheries on Fraser River sockeye salmon (O. nerka). Can. J. Fish. Aquat. Sci. 51(7): 1535-1549.

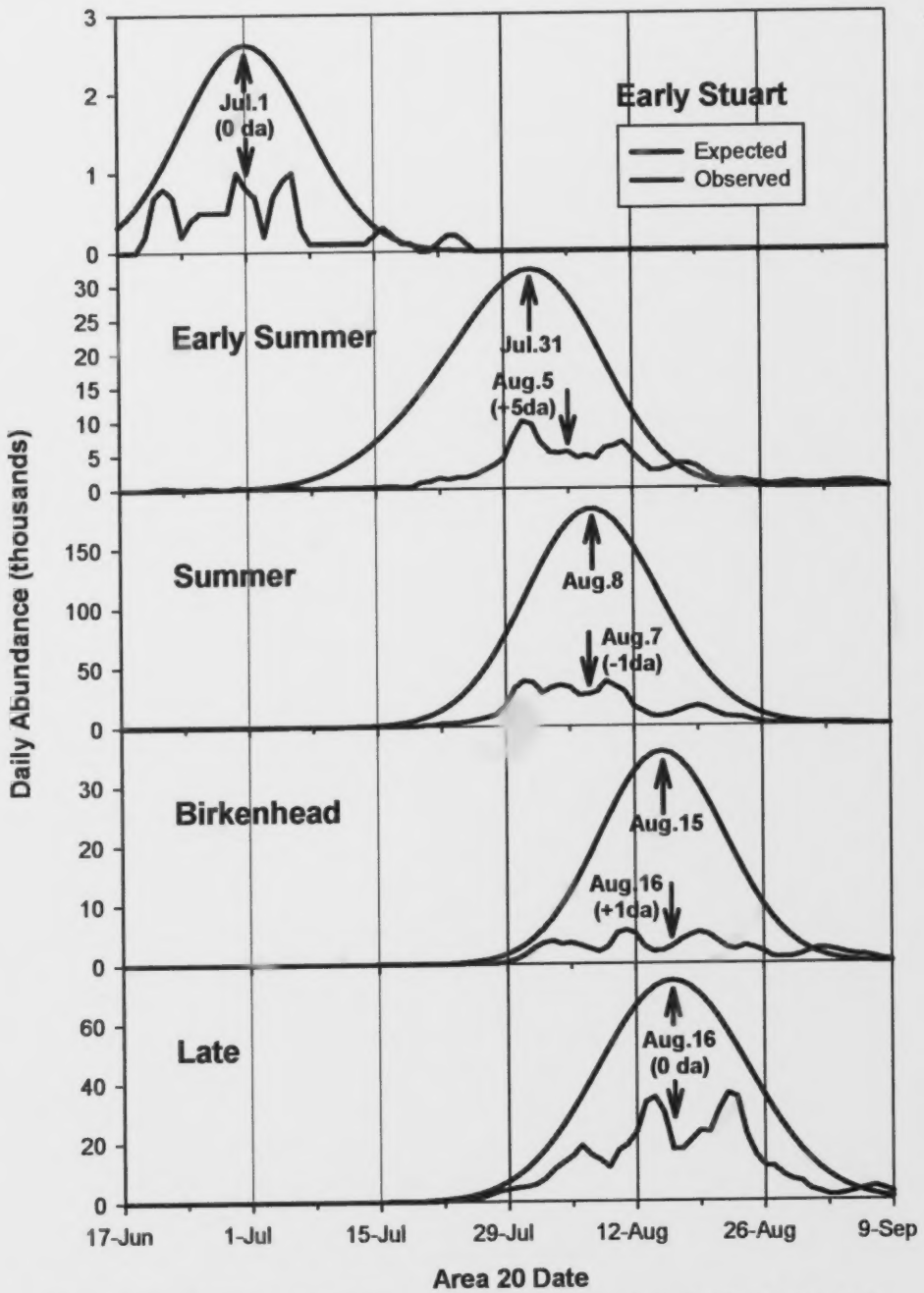

Figure 3. Pre-season projections and post-season reconstructions of daily abundance of Fraser River sockeye salmon by management group in 2007 (Area 20 date), including the observed 50% dates and number of days difference with the pre-season expectations. This figure shows the extremely low abundance of each sockeye management group compared to pre-season expectations.

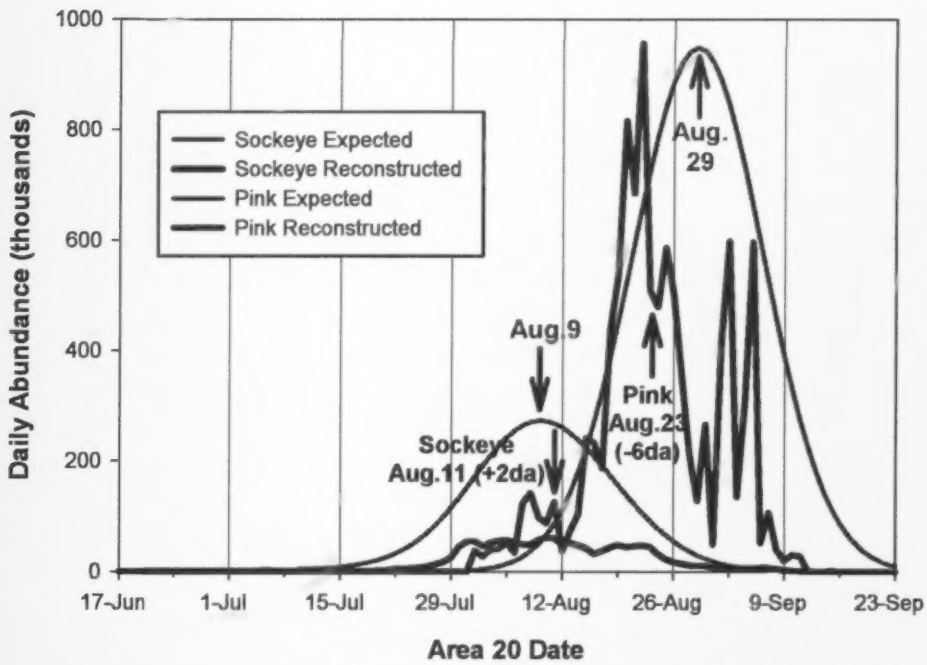

Figure 4. Pre-season projections and post-season reconstructions of daily abundance of Fraser River sockeye and pink salmon in 2007 (Area 20 date), including the observed 50% dates and number of days difference with the pre-season expectations. This figure shows the extremely low sockeye abundance compared to pre-season expectations.

The Government of Canada confirmed in the 2007 Integrated Fisheries Management Plan [5] (IFMP) that the objective for Cultus Lake sockeye was to limit the exploitation rate to 20%. All Canadian fisheries that could harvest Cultus sockeye would be impacted by the need to limit harvest of this stock. While this constraint was expected to impact Canadian fishing plans, the U.S. share of the TAC was unaffected.

During the pre-season planning process, the Parties identified a number of stocks for which they had conservation and management concerns. Species and stocks identified by Canada included Skeena River and Thompson River coho salmon, Lower and Upper Georgia Strait coho salmon, Johnstone Strait coho salmon, summer-run chum salmon, Thompson River steelhead and West Coast Vancouver Island and Harrison River chinook salmon. The species and stocks identified by the United States included Hood Canal summer-run chum and Puget Sound chinook salmon.

B. In-season Management

The Fraser River Panel convened 21 times between July 13 and September 19, to discuss run status and enact In-season Orders (Appendix G) to regulate fisheries directed at Fraser River sockeye and pink salmon harvest in Panel Areas.

The 2007 fishery management season was difficult, primarily due to very poor returns from the 2003 brood. In 2003, Fraser River sockeye spawners totalled 2.0 million fish, including 1.0 million females that spawned successfully. The forecast return of age 4_2 recruits from this brood was 5.1 million fish, representing 4.9 fish per effective female spawner. In contrast, the observed return was 782,000 age 4_2 fish, representing only 0.75 fish per effective female. This is the lowest

[5] 2007/2008 Southern B.C. Salmon Integrated Fishery Management Plan. Fisheries and Oceans Canada.

age 4_2 return per effective female spawner on record, less than half the next lowest production value (1.7) and compares extremely poorly against the average of 4.7 since 1952. Very poor marine productivity in near-shore coastal waters in the year that smolts from the 2003 brood entered the ocean (2005) may be the main contributor to the poor survival, a conclusion that is supported by poor returns of several other salmon species and stocks whose ocean entry year was also 2005. Based on the Panel's pre-season plan, substantial fishing opportunities were expected with projected catches of 2.1 million sockeye in Canada and 385,000 sockeye in the United States. However, fishing was severely curtailed because the low Fraser sockeye abundance (Figure 3) meant that virtually all returning sockeye were required for spawning. In addition, the migrations of Fraser River sockeye and pink salmon overlapped widely (Figure 4), resulting in severely reduced fishing opportunities for Fraser pink stocks due to the risk of unacceptably large by-catches of sockeye.

The main events of the season are summarized below. Table 2 shows the pre-season assumptions and weekly in-season estimates. The last entry in Table 2 represents the date when control of the last Panel Area was relinquished (September 21) and when the calculation of TAC and international shares was frozen, in accordance with Annex IV of the Treaty.

The first in-season meeting of the Panel took place on July 13. The only test fishery data available was from the Whonnock gillnet fishery in the lower Fraser River, because start-up of the Area 20 gillnet test fishery was delayed until July 14 to minimize the catch of Early Stuart sockeye. Preliminary assessments indicated that Early Stuart sockeye were tracking well below the median abundance forecast (45,000 fish). Migration conditions in the Fraser River were mildly unfavourable for the date, with both discharges and temperatures slightly higher than normal.

Test fishing catches in Juan de Fuca and Johnstone Straits were very low during the week of July 15 – 21, a period when Early Summer and Summer-run abundances normally begin to increase. Age composition data from marine test fishery samples showed low proportions of age 4_2 fish. Staff noted that this trend extended to other coastal sockeye stocks, including Barkley Sound, Nimpkish and Lake Washington. In addition, seals were interfering with in-river test fishing operations by removing most salmon caught, making species composition and sockeye stock proportions at Mission difficult to assess. High water levels in the river were affecting the hydroacoustic operation on the south shore ("left bank") where most sockeye migrate, exacerbating the difficulties in estimating sockeye escapement past Mission. Estimates of the cumulative escapement to date past Mission through July 19 totalled 16,300 fish, including 11,000 Early Stuart, 5,000 Early Summer (primarily from Chilliwack Lake) and 300 Summer-run sockeye. The migration of Fraser sockeye was tracking well below expectations for the date and Staff recommended the Panel adopt a reduced Early Stuart abundance of 12,000 fish. The Panel deferred adopting the lower abundance until additional data became available. The Fraser River discharge at Hope was 6,600 m^3/s, or 1,100 m^3/s higher than average, while the water temperature at Qualark was 17.1°C, almost 1°C above normal for the date.

Sockeye migration during the week of July 22 – 28 continued to track well below expected levels. Catches in the Area 20 and Area 12 gillnet test fisheries remained poor. There was an unexpected increase in sockeye observations in the Area 7 reefnet test fishery, possibly indicating an increase in the daily migration via the southern approach route. Catches remained very low in the Whonnock test fishery due to low sockeye migration levels, but exacerbated by high rates of salmon removal from the gillnet by seals. Age composition data continued to show low proportions of age 4_2 sockeye, signalling potential weakness in the age 4 return. DNA samples analyzed during the week consisted of approximately 30% Early Summer, 50% Summer and 20% Late-run fish (primarily Harrison sockeye). Mission hydroacoustic estimates continued to show relatively small daily migrations. On July 27, the Panel approved a run-size increase to 13,000 Early Stuart sockeye with an Area 20 50% date of July 1 (consistent with pre-season expected timing). Staff also reported that the Early Summer-run return was unlikely to reach the pre-season forecast of 690,000 fish. Environmental conditions in the Fraser River were satisfactory for sockeye migration, with discharge above normal (6,100 m^3/s) but below the threshold that seriously impedes migration, and with water temperatures (16.7°C) near normal for the date. Panel Area fisheries remained closed. At the end of the week Canada opened limited in-river First Nations FSC (Food, Social and Ceremonial) fisheries.

Table 2. Pre-season and weekly in-season updates of run size, spawning escapement targets and other TAC-related values for Fraser River sockeye and pink salmon in 2007. The available harvest (run size minus spawning escapement target and management adjustment), catch to date, Mission escapement to date and migration timing are also shown.

				TAC						Available			50% Migration Date	
Date	Management Group	Total Abundance	Spawning Escapement Target	pMA *	Manage-ment Adjust.	Test Fishing	Aboriginal Fishery Exemption	Total Allowable Catch	Harvest (incld. TF + AFE)	Catch to date	Mission Escape. to date	Area 20	Mission
Pre-season	Early Stuart	45,000	45,000	1.92	86,000	0	0	0	0			1-Jul	7-Jul
	Early Summer	690,000	276,000	0.3230	89,000	0	42,800	282,200	325,000			31-Jul	6-Aug
	Summer	3,369,000	1,348,000	0.00	0	0	269,600	1,751,400	2,021,000			8-Aug	14-Aug
	Birkenhead	613,000	245,000	0.00	0	0	16,300	351,700	368,000			15-Aug	.
	Late	1,530,000	612,000	0.74	453,000	0	71,300	393,700	465,000			16-Aug	29-Aug
	Sockeye	**6,247,000**	**2,526,000**		**628,000**	**0**	**400,000**	**2,779,000**	**3,179,000**			**9-Aug**	
	Pink	**19,570,000**	**6,000,000**			**0**		**13,570,000**	**13,570,000**			**29-Aug**	
July 22-28 In-season	Early Stuart	13,000	13,000	1.92	25,000	500	0	0	0	400	11,900	1-Jul	7-Jul
	Early Summer	690,000	276,000	0.3230	89,000	10,000	42,800	272,200	325,000	500	6,400	31-Jul	6-Aug
	Summer	3,369,000	1,348,000	0.00	0	40,000	269,600	1,711,400	2,021,000	800	1,600	8-Aug	14-Aug
	Birkenhead	613,000	245,000	0.00	0	3,500	16,300	348,200	368,000	0	200	15-Aug	.
	Late	1,530,000	612,000	0.74	453,000	10,000	71,300	383,700	465,000	200	1,000	16-Aug	29-Aug
	Sockeye	**6,215,000**	**2,494,000**		**567,000**	**64,000**	**400,000**	**2,715,500**	**3,179,000**	**1,900**	**21,100**		
	Pink	**19,570,000**	**6,000,000**			**0**		**13,570,000**	**13,570,000**	**0**		**29-Aug**	
July 29-Aug. 4 In-season	Early Stuart	13,000	13,000	1.06	14,000	500	0	0	0	700	12,600	1-Jul	7-Jul
	Early Summer	231,000	174,000	0.3257	57,000	10,000	10,000	0	0	3,600	18,800	31-Jul	6-Aug
	Summer	3,369,000	1,348,000	0.00	0	40,000	294,300	1,686,700	2,021,000	7,500	26,800	8-Aug	14-Aug
	Birkenhead	613,000	245,000	0.00	0	3,500	17,800	346,700	368,000	200	600	15-Aug	.
	Late	1,530,000	612,000	0.74	453,000	10,000	77,900	377,100	465,000	1,700	14,200	16-Aug	29-Aug
	Sockeye	**5,756,000**	**2,392,000**		**524,000**	**64,000**	**400,000**	**2,410,500**	**2,854,000**	**13,700**	**73,000**		
	Pink	**19,570,000**	**6,000,000**			**0**		**13,570,000**	**13,570,000**	**0**		**29-Aug**	
August 5-11 In-season	Early Stuart	13,000	13,000	1.06	14,000	500	0	0	0	900	12,600	1-Jul	7-Jul
	Early Summer	150,000	150,000	0.3258	49,000	10,000	10,000	0	0	5,600	63,100	3-Aug	6-Aug
	Summer	1,261,000	600,000	0.00	0	40,000	294,300	326,700	661,000	13,700	204,400	8-Aug	14-Aug
	Birkenhead	613,000	292,000	0.00	0	3,500	17,800	299,700	321,000	500	12,600	15-Aug	.
	Late	1,530,000	612,000	0.74	453,000	10,000	77,900	377,100	465,000	3,900	78,300	16-Aug	29-Aug
	Sockeye	**3,567,000**	**1,667,000**		**516,000**	**64,000**	**400,000**	**1,003,500**	**1,447,000**	**24,600**	**371,000**		
	Pink	**19,570,000**	**6,000,000**			**0**		**13,570,000**	**13,570,000**	**200**		**29-Aug**	
August 12-18 In-season	Early Stuart	13,000	13,000	1.06	14,000	100	0	0	0	900	12,600	1-Jul	7-Jul
	Early Summer	150,000	150,000	0.2171	33,000	4,000	10,000	0	0	14,500	101,500	3-Aug	6-Aug
	Summer	750,000	600,000	0.00	0	20,000	294,300	0	150,000	61,800	436,600	8-Aug	14-Aug
	Birkenhead	227,000	182,000	0.00	0	2,000	17,800	25,200	45,000	6,800	33,300	15-Aug	.
	Late	600,000	415,000	0.74	307,000	10,000	77,900	0	0	30,900	190,500	16-Aug	29-Aug
	Sockeye	**1,740,000**	**1,360,000**		**354,000**	**36,100**	**400,000**	**25,200**	**195,000**	**114,900**	**774,500**		
	Pink	**19,570,000**	**6,000,000**			**0**		**13,570,000**	**13,570,000**	**4,600**		**29-Aug**	
August 19-25 In-season	Early Stuart	13,000	13,000	1.06	14,000	100	0	0	0	900	12,600	1-Jul	7-Jul
	Early Summer	170,000	170,000	0.2171	37,000	4,000	10,000	0	0	17,000	121,300	5-Aug	11-Aug
	Summer	825,000	600,000	0.00	0	20,000	294,300	0	225,000	93,900	495,800	10-Aug	16-Aug
	Birkenhead	150,000	109,000	0.00	0	2,000	17,800	21,200	41,000	8,000	51,400	15-Aug	.
	Late	800,000	415,000	0.79	328,000	10,000	77,900	0	57,000	35,800	271,400	16-Aug	27-Aug
	Sockeye	**1,958,000**	**1,307,000**		**379,000**	**36,100**	**400,000**	**21,200**	**323,000**	**155,600**	**952,500**		
	Pink	**19,570,000**	**6,000,000**			**0**		**13,570,000**	**13,570,000**	**24,700**		**29-Aug**	
Aug.26-Sep.1 In-season	Early Stuart	13,000	13,000	1.06	14,000	100	0	0	0	800	12,600	1-Jul	7-Jul
	Early Summer	155,000	155,000	0.2171	34,000	4,000	10,000	0	0	20,900	134,400	4-Aug	10-Aug
	Summer	650,000	600,000	0.00	0	20,000	294,300	0	50,000	123,300	562,000	6-Aug	12-Aug
	Birkenhead	100,000	92,000	0.00	0	2,000	17,800	0	8,000	10,400	75,000	13-Aug	.
	Late	510,000	415,000	0.79	328,000	10,000	77,900	0	0	44,100	318,400	11-Aug	29-Aug
	Sockeye	**1,428,000**	**1,275,000**		**376,000**	**36,100**	**400,000**	**0**	**58,000**	**199,500**	**1,102,400**		
	Pink	**10,000,000**	**6,000,000**			**0**	**0**	**4,000,000**	**4,000,000**	**247,400**		**29-Aug**	

Table 2, continued on next page.

Table 2, continued.

Date		Management Group	Total Abundance	TAC: Spawning Escapement Target	pMA *	Manage-ment Adjust.	Test Fishing	Aboriginal Fishery Exemption	Total Allowable Catch	Available Harvest (Incld. TF + AFE)	Catch to date	Mission Escape. to date	50% Migration Date: Area 20	50% Migration Date: Mission
September 2-8	In-season	Early Stuart	13,000	13,000	1.06	14,000	100	0	0	0	800	12,600	1-Jul	7-Jul
		Early Summer	155,000	155,000	0.2171	34,000	4,000	10,000	0	0	21,500	138,900	4-Aug	10-Aug
		Summer	650,000	600,000	0.00	0	20,000	294,300	0	50,000	136,500	517,700	6-Aug	12-Aug
		Birkenhead	100,000	92,000	0.00	0	2,000	17,800	0	8,000	11,300	86,200	13-Aug	.
		Late	510,000	415,000	0.79	328,000	10,000	77,900	0	0	45,600	351,000	11-Aug	29-Aug
		Sockeye	**1,428,000**	**1,275,000**		**376,000**	**36,100**	**400,000**	**0**	**58,000**	**215,700**	**1,106,400**		
		Pink	**10,000,000**	**6,000,000**			**0**		**4,000,000**	**4,000,000**	**385,400**		**29-Aug**	
September 9-15	In-season	Early Stuart	13,000	13,000	1.06	14,000	100	0	0	0	800	12,600	1-Jul	7-Jul
		Early Summer	155,000	155,000	0.2171	34,000	4,000	10,000	0	0	21,600	144,800	4-Aug	10-Aug
		Summer	650,000	600,000	0.00	0	20,000	294,300	0	50,000	140,000	588,700	6-Aug	12-Aug
		Birkenhead	100,000	92,000	0.00	0	2,000	17,800	0	8,000	11,400	110,500	13-Aug	.
		Late	510,000	415,000	0.79	328,000	10,000	77,900	0	0	45,900	439,900	11-Aug	29-Aug
		Sockeye	**1,428,000**	**1,275,000**		**376,000**	**36,100**	**400,000**	**0**	**58,000**	**219,700**	**1,296,500**		
		Pink	**11,000,000**	**6,000,000**				**0**	**5,000,000**	**5,000,000**	**442,700**		**23-Aug**	
Sep. 16-22	In-season	Early Stuart	13,000	13,000	1.06	14,000	100	0	0	0	800	12,600	1-Jul	7-Jul
		Early Summer	155,000	155,000	0.2171	34,000	4,000	10,000	0	0	21,500	143,600	4-Aug	10-Aug
		Summer	650,000	600,000	0.00	0	20,000	294,300	0	50,000	140,000	585,800	6-Aug	12-Aug
		Birkenhead	100,000	92,000	0.00	0	2,000	17,800	0	8,000	11,400	104,800	13-Aug	.
		Late	510,000	415,000	0.79	328,000	10,000	77,900	0	0	46,000	458,300	11-Aug	29-Aug
		Sockeye	**1,428,000**	**1,275,000**		**376,000**	**36,100**	**400,000**	**0**	**58,000**	**219,700**	**1,305,100**		
		Pink	**11,000,000**	**6,000,000**			**0**		**5,000,000**	**5,000,000**	**442,700**		**23-Aug**	
September 21	TAC Date	Early Stuart	13,000	13,000	1.06	14,000	100	900	0	0	800	12,600	1-Jul	7-Jul
		Early Summer	155,000	155,000	0.2171	34,000	4,000	18,100	0	0	21,600	143,500	4-Aug	10-Aug
		Summer	650,000	600,000	0.00	0	20,000	133,300	0	50,000	143,600	585,000	6-Aug	12-Aug
		Birkenhead	100,000	92,000	0.00	0	2,000	7,800	0	8,000	11,400	102,600	13-Aug	.
		Late	510,000	415,000	0.79	328,000	10,000	36,800	0	0	46,600	462,000	11-Aug	29-Aug
		Sockeye	**1,428,000**	**1,275,000**		**376,000**	**36,100**	**196,900**	**0**	**58,000**	**224,000**	**1,305,700**		
		Pink	**11,000,000**	**6,000,000**			**0**		**5,000,000**	**5,000,000**	**869,000**		**23-Aug**	

* Early Summer pMAs apply to the spawning escapement target for the entire management group including Pitt River sockeye.

During the week of July 29 – August 4, the number and proportion of age 4_2 sockeye remained much lower than forecasted (25-40% in marine samples instead of expected 80-90%). Catches in marine gillnet test fisheries continued to track far below pre-season expectations. Similarly, in-river test fishery catches and Mission escapements were poor, although there had been a modest increase in escapements over the weekend associated with the spike in reefnet catches the prior week. In addition, the sockeye migration past Hells Gate as assessed through visual observations had been extremely poor. By the end of the week, some encouraging signs emerged such as increased Area 20 gillnet catches, and marine (Areas 12 and 20) purse seine test fishery catches that exceeded expectations based on prior-day gillnet test fishery catches. The majority of sockeye appeared to be migrating via Juan de Fuca Strait. Lending support for this were increasing catches in Area 5 gillnet and Area 7 reefnet test fisheries in U.S. waters. DNA analyses of sockeye samples from recent marine test fisheries showed contributions of approximately 15% Early Summer, 70% Summer and 15% Late-run stocks (primarily Harrison sockeye). There was general weakness (or late timing) in the return of the Seymour / Scotch stock group, which was forecast to comprise about 60% of the total Early Summer return. Mission escapements continued to track well below expectations for the date. Most of the Mission escapement of Late-run sockeye were from the Harrison River stock (13,500 fish). A limited First Nations FSC fishery in the Fraser River was estimated to have landed about 5,000 sockeye.

With increasing evidence of a weak age 4 sockeye return, the Panel adopted a reduced abundance of 231,000 Early Summer sockeye (i.e., the 90% probability level forecast) for management purposes. Summer-run sockeye were also tracking well below the median forecast, and the Panel was apprised that the Summer run was either significantly later or less abundant than forecast. Fraser River discharge levels (4,900 m^3/s at Hope) were tracking about 400 m^3/s

above normal, while the water temperature (17.7°C at Qualark) was near the average for the date. The Panel adopted a reduced Early Stuart MA factor of 1.06 as a final in-season estimate. Due to the low abundance of Early Summer and Summer-run sockeye in marine waters and poor escapement levels past Mission, all fisheries under Panel control remained closed (as did non-Panel Area marine fisheries). Canada announced that the limited FSC fishery would continue in the Fraser River.

During the week of August 5 – 11, marine test fishing catches remained well below expected levels for the date. Migration through Johnstone Strait had increased while the Juan de Fuca migration had tailed off. The overall migration profile remained relatively flat (40,000 to 80,000 fish per day). Low proportions of age 4_2 sockeye (45% – 55% compared to expectations of 90%) continued to indicate the sockeye return was significantly below forecast. Sockeye escapement past Mission, while increasing, was tracking below marine-based projections and remained far below pre-season expectations. Meanwhile, sockeye stock composition in marine samples averaged 10% Early Summer, 55% Summer and 35% Late-run sockeye. While the proportion of Early Summer sockeye was holding steady, the Seymour / Scotch component continued to track significantly below expected levels. Proportions of Summer-run stocks were also below expected levels, while Late-run proportions were higher (Late Shuswap fish in particular). Total catches of Fraser River sockeye to date included 9,400 fish in Canadian marine and in-river First Nations fisheries and 15,200 fish in Panel-approved test fisheries.

Staff reported that the peak Summer-run migration should have occurred on August 8 (Area 20 timing) if the run was normally timed, but run timing was likely later than forecast. The Panel accepted a Staff recommendation to reduce the Early Summer run size to 150,000 fish, with an Area 20 timing date of August 3. The Panel also approved a Summer-run downgrade to 1,261,000 fish (the 90% probability level forecast) for management purposes. Staff reported that Fraser River pink salmon were being detected in marine areas and were also being caught in an experimental fish wheel operating just below the Mission hydroacoustic monitoring site. Staff raised concerns that significant difficulties could occur in estimating species composition at Mission as the in-river migration of pink salmon increased over the coming weeks. Fraser River discharge at Hope was about 4,200 m^3/s (400 m^3/s higher than normal), while the water temperature was 18.2°C (0.5°C above average). Due to the extremely low sockeye returns for the date, no fisheries under Panel control were approved. Canada announced limited First Nations fishing in marine and in-river waters for FSC purposes.

Early in the week of August 12 – 18, a decline in purse seine test fishing catches in Area 20 along with increased catches in Johnstone Strait indicated the Johnstone Strait sockeye diversion rate had increased to 60% or more. However, overall sockeye abundance remained far below pre-season expectations. Recent Mission hydroacoustic estimates had closely tracked marine-based projections, which provided evidence that species composition estimates at Mission were reasonably accurate. However, the in-river pink salmon migration was increasing rapidly and Staff acknowledged significant uncertainty in estimates of daily sockeye and pink salmon proportions being applied to the total salmon migration past Mission. Most Late-run sockeye appeared to be entering the Fraser River with little delay, and the majority of Late-run migrants past Mission continued to be Harrison sockeye. DNA analyses of sockeye sampled in marine test fisheries averaged 10% Early Summer, 45% Summer, 10% Birkenhead and 35% Late-run sockeye. Reported catches to date included: 42,900 fish by Canadian marine First Nations, 49,600 fish by in-river First Nations and 22,300 fish in Panel approved test fisheries.

The trend of very low sockeye returns was occurring across all Fraser sockeye stocks with the exception of Harrison River sockeye in the Late-run group, which was significantly more abundant than the pre-season forecast. The Panel accepted Staff recommendations for run-size downgrades to 120,000 fish for Early Summer, 750,000 fish for Summer (approximately 60% Chilko and very weak returns of other Summer-run stocks), 227,000 fish for Birkenhead and 504,000 fish for Late-run sockeye (i.e., 90% probability level forecasts for both Birkenhead and Lates). Later in the week, the Panel increased the Early Summer estimate back to 150,000 fish and the Late-run abundance to 600,000 fish (400,000 Late Shuswap/Weaver and 200,000 Harrison). Staff also noted that the Summer-run estimate was about 800,000 fish, but since this was not substantially different from the current adopted estimate of 750,000 fish the Panel did not change the run size. Fraser River discharge at Hope was tracking near average levels for the date (3,300

m^3/s), as were water temperatures (17.4°C). The Panel approved a reduced MA factor of 0.22 for the Early Summer run. The Panel did not approve any fisheries due to continued low sockeye abundances in marine areas and with surpluses of only Summer-run and Birkenhead fish available for harvest. Canada announced that marine and in-river First Nations fisheries below Sawmill Creek had closed or were scheduled to close by the weekend, while FSC fisheries above Sawmill Creek that were primarily directed at Summer-run sockeye were proceeding.

Also during the week of August 12 – 18, test fishing catches of pink salmon had increased relative to the previous week, particularly in Johnstone Strait, and the estimated Johnstone Strait diversion of pink salmon was 85%. DNA-based estimates of pink salmon stock composition in marine test fisheries averaged 60% Fraser River, 15% Washington State and 25% Canada South Coast stocks. Staff noted that run-size estimates for Fraser pink salmon would be provided over the coming weeks as additional data became available.

During the week of August 19 – 25, staff reported DNA evidence that Fraser sockeye were being landed in Alaskan fisheries, but noted that in past years such indications had often not materialized in catch and escapement profiles in southern waters. Sockeye catches in Area 20 test fisheries had declined, reflecting a reduced migration via Juan de Fuca Strait. In contrast, higher than expected catches of Fraser sockeye in Johnstone Strait test fisheries provided optimism for higher returns, and resulted in a weekly diversion rate estimate of 80% via Johnstone Strait. Recent DNA analyses of sockeye samples from marine test fisheries averaged 10% Early Summer, 30% Summer, 15% Birkenhead and 45% Late-run sockeye. Age composition data from marine samples continued to show very weak age 4_2 proportions (40% – 60%). Mission hydroacoustic estimates continued to track marine-based sockeye projections fairly closely. A recent surge in pink salmon migration past Mission, however, raised concerns about bias in the species composition estimates applied to Mission escapement estimates. After a technical evaluation of various options to address these concerns, the Panel approved the use of daily estimates of sockeye and pink salmon composition in marine purse seine test fishery samples (moved into the river with appropriate time lags applied) to estimate Mission escapement by species. Most Late-run sockeye continued to enter the Fraser River with little delay. Sockeye catches to date included 42,900 fish by Canadian marine First Nations, 82,100 fish by in-river First Nations and 30,200 fish in Panel-approved test fisheries. Run-size estimates adopted by the Panel included increases for Early Summers to 170,000 fish (Area 20 50% date of August 5, five days later than forecast), Summers to 825,000 fish (Area 20 date of August 10, two days later than forecast) and Lates to 800,000 fish, and a decrease for Birkenhead sockeye to 150,000 fish. The Late-run upgrade was comprised of 600,000 Late Shuswap and Weaver fish (Area 20 date of August 19) and 200,000 Harrison fish. At the same time the Late-run MA factor was increased to 0.79. Near the end of the week the Fraser River discharge at Hope was 2,900 m^3/s (near average for the date) and the water temperature at Qualark was 17.5°C (slightly above normal).

Meanwhile, the proportion of pink salmon relative to sockeye in marine areas was building rapidly as sockeye abundance declined and pink abundance increased. DNA samples from these areas indicated that Fraser stocks comprised about 75% of the pink migration. The estimated weekly diversion rate for Fraser pinks through Johnstone Strait was 45%. Run-size assessments were consistent with the forecast of 19.6 million fish, but more accurate assessments would not be available until after the peak migrations through Juan de Fuca and Johnstone Straits. The Panel approved pink-directed fisheries in U.S. Areas 4B, 5 and 6C and Areas 6, 7 and 7A for Treaty Indian fishers, and pink salmon fisheries with non-retention of sockeye in Areas 7 and 7A for All Citizen fishers.

By the week of August 26 – September 1, sockeye and pink test fishery catches had not increased in Johnstone Strait even though tides were favourable. Sockeye escapements at Mission were lower than expected from marine area projections. While recent DNA results showed that Early Summer, Summer and Late-run sockeye were still present, abundance was declining rapidly across all stock groups. Most Late-run sockeye appeared to be entering the Fraser River with little delay. Reported sockeye catches through the end of the week included 42,900 fish by Canadian marine First Nations, 122,700 fish by in-river First Nations, 400 fish in U.S. Treaty Indian ceremonial fisheries and 32,200 fish in Panel-approved test fisheries. The Panel adopted reduced sockeye abundances as follows: Early Summer - 155,000 fish (Area 20 50% date of August 4, four days later than expected), Summer - 650,000 fish (Area 20 date of August 6, two days earlier than

expected), Birkenhead - 100,000 fish (50% date of August 13, two days earlier than expected) and Late run - 510,000 fish (including 330,000 Late Shuswap / Weaver sockeye with an Area 20 50% date of August 14, two days earlier than expected, and 180,000 Harrison sockeye). Environmental conditions in the Fraser River were satisfactory for salmon migration, with discharge at Hope at 2,500 m^3/s and water temperature about 16.8°C. Due to the poor sockeye returns all sockeye-directed fisheries remained closed.

Also during the week of August 26 – September 1, Fraser River pink salmon were migrating primarily through Juan de Fuca Strait, with 39% arriving via Johnstone Strait. DNA analysis indicated 78% of these were Fraser pinks, 10% were Washington stocks and 12% Canada South Coast stocks. Due to a substantial decrease in the marine abundance of Fraser pinks compared to the previous week, the Panel adopted a reduced run size of 10 million fish (close to the 90% probability level forecast). The Panel approved pink-directed fisheries in U.S. Areas 4B, 5 and 6C and Areas 6, 7 and 7A for Treaty Indian fishers, and pink-directed fisheries with non-retention of sockeye in Areas 7 and 7A for All Citizen fishers. A portion of Area 7A near Point Roberts remained closed to further protect Fraser sockeye. For the Treaty Indian fisheries, any incidental sockeye catch was to be used for Ceremonial and Subsistence (C&S) purposes. Catches to date of Fraser pinks included: U.S. Treaty Indian - 91,700 fish, U.S. All Citizen - 93,000 fish, Canadian marine First Nations - 5,900 fish, in-river First Nations - 9,000 fish, Canadian recreational - 17,000 fish, and Panel approved test fisheries - 30,800 fish.

Marine test fishery catches through the week of September 2 – 8 continued to indicate low levels of daily sockeye migration and moderate levels of pink salmon migration. DNA samples from marine areas indicated that approximately 90% of pink salmon were of Fraser River origin. Environmental conditions in the Fraser River continued to be satisfactory for salmon migration. The Panel approved U.S. pink-directed fisheries in Areas 4B, 5 and 6C and Areas 6, 7 and 7A for Treaty Indian fishers, and pink salmon fisheries with non-retention of sockeye in Areas 7 and 7A for All Citizen fishers. Panel control of Areas 4B, 5 and 6C was relinquished on September 8. A Canadian Area H troll fishery directed at pink salmon (with non-retention of sockeye) was approved for Area 18. Sockeye catches to date included: Canadian marine First Nations - 42,900 fish, in-river First Nations - 135,600 fish, U.S. Treaty Indian ceremonial - 3,900 fish and Panel-approved test fisheries - 33,400 fish. Catches of Fraser pink salmon included: U.S. Treaty Indian - 187,400 fish, U.S. All Citizen - 132,500 fish, Area H troll - 1,100 fish, Canadian marine First Nations - 5,900 fish, in-river First Nations - 9,000 fish, Canadian recreational - 17,000 fish, and Panel approved test fisheries - 32,500 fish.

By the week of September 9 – 15, the marine migrations of sockeye and pink salmon were nearing completion (Figure 4). Although the adopted run sizes of Fraser River sockeye remained unchanged, Staff reported that a stronger than expected migration of Fraser sockeye into the river may result in small increases in run size once final catches and Mission escapements were accounted for. As a result of higher than expected catches in U.S. fisheries over the prior week, the Panel adopted an increased Fraser pink run size of 11.0 million fish, with a corresponding Area 20 50% date of August 23 (six days earlier than forecast). The Panel approved U.S. pink-directed fisheries with non-retention of sockeye in Areas 7 and 7A for All Citizen fishers. Sockeye catches to date included: Canadian marine First Nations - 42,900 fish, in-river First Nations - 139,100 fish, U.S. Treaty Indian ceremonial catch - 3,900 fish, and Panel approved test fisheries - 33,800 fish. Fraser River pink catches to date included: U.S. Treaty Indian - 216,600 fish, U.S. All Citizen - 159,600 fish, Area H troll - 1,400 fish, Canadian marine First Nations - 5,900 fish, in-river First Nations - 9,100 fish, Canadian recreational - 17,000 fish, and Panel approved test fisheries - 33,100 fish.

The last in-season meeting of the Fraser River Panel took place on September 19. Final in-season escapement estimates at Mission were: Early Stuart – 12,600 fish, Early Summer - 143,600 fish, Summer – 585,800 fish, Birkenhead – 104,800 fish, and Late-run sockeye – 458,300 fish. No changes were made to the in-season estimates of run size, management adjustment or catch.

On September 21 (last entry in Table 2), the Panel relinquished control of the last U.S. Panel Area (Table 3). According to the revised Annex IV, Chapter 4 of the Pacific Salmon Treaty and the Commission Guidance to the Panel, the calculation of the TAC and international shares was

frozen on this date, although the catches to be compared with these shares would be post-season estimates.

Fishing times in Canadian and U.S. commercial fisheries that target Fraser River sockeye and pink salmon are summarized in Tables 3 and 4, respectively. In Canada, no fishing was scheduled *in Area 20 due to* coho conservation concerns. While not under Panel control, management of Canadian non-Panel fisheries directed at Fraser River sockeye and pink salmon is based on the same in-season information and hierarchy of objectives, with priority given to First Nations harvest within Canada's allocation. Although not shown in Table 4, most fishing effort in Canada occurred in such First Nations fisheries.

Table 3. Number of days when fishing occurred in U.S. net fisheries in the Fraser River Panel Area in 2007. Regulatory control of U.S. Panel Areas was relinquished by the Panel on September 8 for Areas 4b, 5 and 6c, and September 21 for Areas 6, 7 and 7a , in accordance with pre-season regulations (Appendix F) and in-season orders (Appendix G).

	Treaty Indian		All Citizen		
	Areas	Areas	Areas 7 and 7A		
Date	4B, 5, 6C	6, 7, 7A	Purse Seine	Gillnet	Reefnet
Jul.15-Aug.18					
Aug.19-Aug.25	3				3
Aug.26-Sep.1	7	5	3	3	4
Sep.2-Sep.8	7	7	5	5	7
Sep.9-Sep.15		2	1	1	7
Sep.16-Sep.22					5
Sep.23-Sep.29					
Total	17	14	9	9	26

Note: All fisheries were directed at Fraser River pink salmon. All Citizen fisheries specified non-retention of sockeye salmon.

Table 4. Number of days when fishing occurred in Canadian commercial fisheries that targeted Fraser River sockeye and pink salmon in 2007. Regulatory control of Canadian Panel Areas was relinquished by the Panel on September 8 for Area 20, September 21 for Areas 17 and 18, and October 13 for Area 29, in accordance with pre-season regulations (Appendix F) and in-season orders (Appendix G).

	Panel Areas				Non-Panel Areas			
	20		29	18, 29	11-16			
	Purse				Purse		Troll	Troll
Date	Seine	Gillnet	Gillnet	Troll	Seine	Gillnet	H	G
Jul.15-Aug.18								
Aug.19-Aug.25								
Aug.26-Sep.1								
Sep.2-Sep.8				4 1				
Sep.9-Sep.15								
Sep.16-Sep.22								
Sep.23-Sep.29								
Total	0	0	0	4	0	0	0	0

1 Area 18 troll open for directed pink salmon fishing, non-retention of sockeye.

IV. MANAGEMENT INFORMATION

To facilitate decision making, the Panel requires information about the abundance, timing, migration route and catch levels of Fraser sockeye (by management group) and pink salmon. Pre-season, these quantities are provided by DFO in the form of forecasts and by PSC Staff through analysis of historical data. Staff update these estimates in-season through various assessment programs (Appendix H). Stock monitoring programs collect information about abundance at various points along the migration route using test fisheries, hydroacoustic facilities (Mission) and observers (Hells Gate). The locations and schedule for these Staff and DFO programs are listed in Table 5. These data are augmented with information from commercial and First Nations fisheries. Stock identification programs collect and analyze biological samples (e.g., DNA, scales) from various fisheries, which allows the total abundance of sockeye to be apportioned into component stock groups. Table 6 shows the stock resolution that was reported in 2007. These stock monitoring and stock identification data are combined to provide estimates of catch, escapement, daily abundance, migration timing and diversion rate, which are the basis for estimating total abundances, escapement targets and catch allocations for the different management groups. These data are compiled and analysed by Staff, reviewed by the Technical Committee and the results provided to the Panel. Staff also provide estimates of Management Adjustments (MAs), which are predictions of how many additional fish should be allowed to escape past Mission to increase the likelihood of achieving spawning escapement targets, given historical differences between in-season and post-season escapement estimates as they relate to migration timing and river conditions.

Information used for Panel management can be divided into three general categories: (1) pre-season forecasts and expectations, on which pre-season planning activities and the management plan are based, (2) in-season estimates that develop over the course of the season and culminate in a set of end-of-season estimates and (3) post-season estimates derived from information that was unavailable during the season, such as spawning ground estimates of escapement, more complete catch estimates, and adjustments to estimates that with hindsight appear to have been biased or incorrect. Key estimates in these categories are summarized in Table 2 and discussed below.

Table 5. Panel-approved stock monitoring operations (test fishery, hydroacoustic, observer) conducted during the 2007 fishing season.

Area	Location	Gear	Dates	Operated by
Canadian Panel Areas				
20	Juan de Fuca Str.	Purse Seine	August 1 - September 7	PSC
20	Juan de Fuca Str.	Gillnet	July 14 - August 12	PSC
29-1 to 6	Str. of Georgia	Troll	August 28 - August 30	PSC
29-13	Fraser R. (Cottonwood)	Gillnet	July 16 - September 17	PSC
29-16	Fraser R. (Whonnock)	Gillnet	June 25 - September 24	PSC
29-16	Fraser R. (Mission)	Gillnet + Setnet	September 4 - September 14	PSC
29-16	Fraser R. (Mission)	Hydroacoustic	July 9 - September 20	PSC
	Fraser R. (Hells Gate)	Observer	July 2 - September 28	PSC
Canadian non-Panel Areas				
12	Queen Charlotte Str. (Round Is.)	Gillnet	July 10 - August 6	DFO
12	Johnstone Str. (Naka Cr.)	Gillnet	July 27 - July 30	DFO
12	Johnstone Str. (Blinkhorn)	Purse Seine	August 1 - September 11	DFO
13	Lower Johnstone Str.	Purse Seine	August 3 - September 9	DFO
United States Panel Areas				
5	Juan de Fuca Str.	Gillnet	July 17 - August 11	PSC
7	San Juan Islands	Reefnet	July 17 - August 18	PSC

Table 6. Individual stocks included in the Fraser River sockeye stock groups used in 2007.

Stock Group	Component Stocks
Early Stuart	
Early Stuart	Early Stuart stocks
Early Summer	
Chilliwack	Chilliwack Lake, Dolly Varden Creek
Early Miscellaneous	Fennell, Bowron, Raft, Nahatlatch, Nadina, Gates
Seymour/Scotch	Scotch, Seymour, early Eagle, Cayenne, Upper Adams
Pitt	Pitt
Summer	
Chilko	Chilko, south end Chilko Lake
Quesnel	Horsefly, McKinley, Mitchell, Roaring, Wasko, Blue Lead
Late Stuart/Stellako	Stellako, Tachie, Middle, Pinchi, Kuzkwa
Birkenhead	
Birkenhead	Birkenhead, Big Silver
Late	
Late Shuswap/Portage	Lower Adams, Portage, Lower Shuswap, Middle Shuswap, Little Shuswap, Shuswap Lake, late Eagle
Weaver/Cultus	Weaver, Cultus
Harrison	Harrison, Widgeon

A. Abundance

End-of-season estimates of run size adopted by the Panel totalled 1.4 million Fraser sockeye (Table 2), substantially below the 90% probability level forecast of 2.2 million (Appendix B) and only 24% of the median pre-season forecast (6.2 million, Table 1). The low number of sockeye returns was consistent among the individual management groups (as well as among other stocks and species in the Pacific northwest): Early Stuart – 29%, Early Summer – 28%, Summer – 19%, Birkenhead – 23% and Lates – 34% of the forecast. As discussed previously, the likely cause was very poor marine survival of salmon that entered the ocean as juveniles in 2005 and returned as adults in 2007.

The end-of-season estimate of Fraser River pink salmon return was 11 million, or 56% of the median forecast. Unlike sockeye salmon, pink salmon that returned in 2007 entered the ocean in 2006 and thus were not impacted by the poor ocean conditions in 2005.

Post-season estimates of run size will be discussed in the next chapter of this report.

B. Migration Timing and Diversion Rate

Post-season estimates of migration timing in 2007 were close to pre-season expectations, with the exceptions of Early Summer sockeye (5 days later than expected, Table 2 and Figure 3) and Fraser pink salmon (6 days earlier than expected, Figure 4). For Harrison and Weaver/Late Shuswap components of the Late sockeye run, the Area 20 50% migration dates were August 6 and August 15 respectively, and the Mission 50% dates were August 12 and August 25.

Annual diversion rates in 2007 were higher than forecast for Fraser sockeye (45% compared to 32% forecast) and lower than forecast for Fraser pink salmon (40% compared to 50% forecast). The weekly sockeye estimate increased from about 30% in July to 80% near the end of August and through the balance of the season (Figure 5). For Fraser pink salmon, weekly estimates decreased from 85% in mid August to about 40% by the end of August and for the balance of the season.

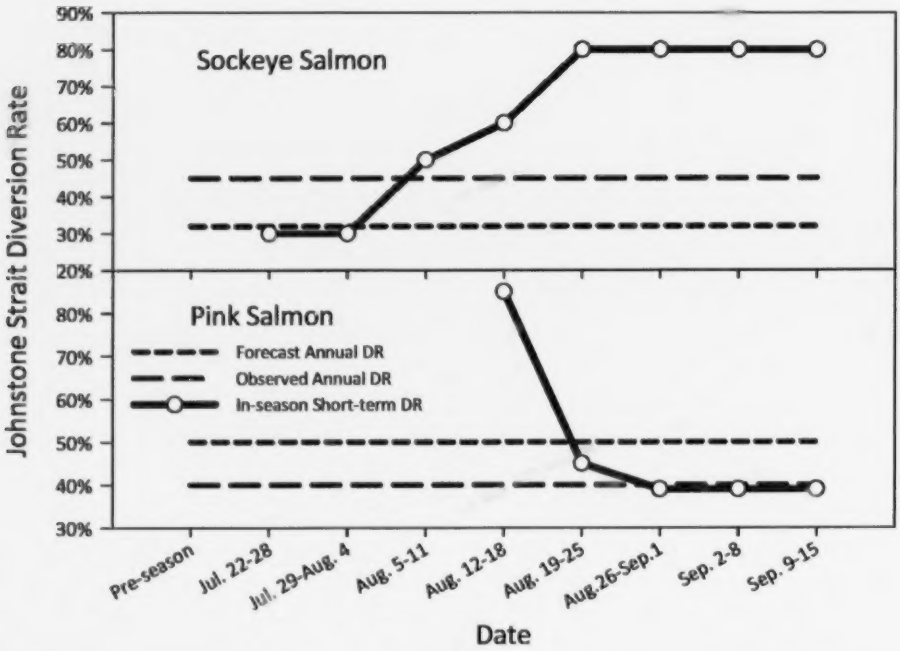

Figure 5. Pre-season forecasts of annual Johnstone Strait diversion for Fraser sockeye and pink salmon, compared to observed short-term and annual rates estimated during the in-season period.

C. Management Adjustments and DBEs

Management Adjustments are based on the median of observed historical values or on statistical models[6,7,8] that consider the historical differences (DBEs) between in-season projections of spawning escapement (i.e., Mission escapement minus catch above Mission, or "potential spawning escapement") and post-season estimates (i.e., spawning ground estimates). For Early Stuart, Early Summer and Summer-run stocks, the models relate historical differences between estimates (DBEs) to the river conditions measured near Hells Gate in the Fraser River. When discharge levels or temperatures are high, DBEs also tend to be high. In addition, for Early Stuart and Early Summer runs, in-season estimates are consistently higher than spawning ground estimates even when migration conditions are within normal ranges, and this tendency is also captured by the MA models. For Late-run sockeye, historical DBEs are related to the date when half the run has migrated past Mission (i.e., 50% date), which captures the effect of the early migration observed in recent years on the migration success of these stocks.

While pre-season MAs and DBEs are based on median values from the historical dataset or on long-range forecasts of river conditions, in-season estimates are most often derived using pre-season or in-season migration timing estimates, and observed and short-range forecasts of river discharge and temperature levels. In contrast, post-season values are calculated independent of any environmental data using post-season estimates of potential spawning escapement (i.e., Mission escapement minus catch above Mission) and spawning ground estimates.

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[6] Hague, M.J., and Patterson, D.A. 2007. Quantifying the sensitivity of Fraser River sockeye salmon (Oncorhynchus nerka) management adjustment models to uncertainties in run timing, run shape and run profile. Can. Tech. Rep. Fish. Aquat. Sci. 2776 : vii + 55p.

[7] Macdonald, J.S., Patterson, D.A., Guthrie, I., Lapointe, M. 2008. Improvements to environmental management adjustment models: SEF final report.

[8] Macdonald, J.S., Patterson, D.A., Hague, M.J., and Guthrie, I.C. 2010. Modeling the influence of environmental factors on spawning migration mortality for sockeye salmon fisheries management in the Fraser River, British Columbia. Transactions of the American Fisheries Society 139:768–782.

Estimates of %DBEs in the pre-season, in-season and post-season periods were generally close in 2007 (Table 7). Compared to in-season estimates, post-season DBE estimates were slightly larger in magnitude for Early Stuart sockeye, smaller for Early Summers, larger for Summers and slightly larger for Late-run sockeye. Both river temperatures and discharge levels were generally close to historic means, with the exception that temperatures were slightly warmer and discharge levels were slightly higher than usual during the Early Stuart migration into the river (Figure 6).

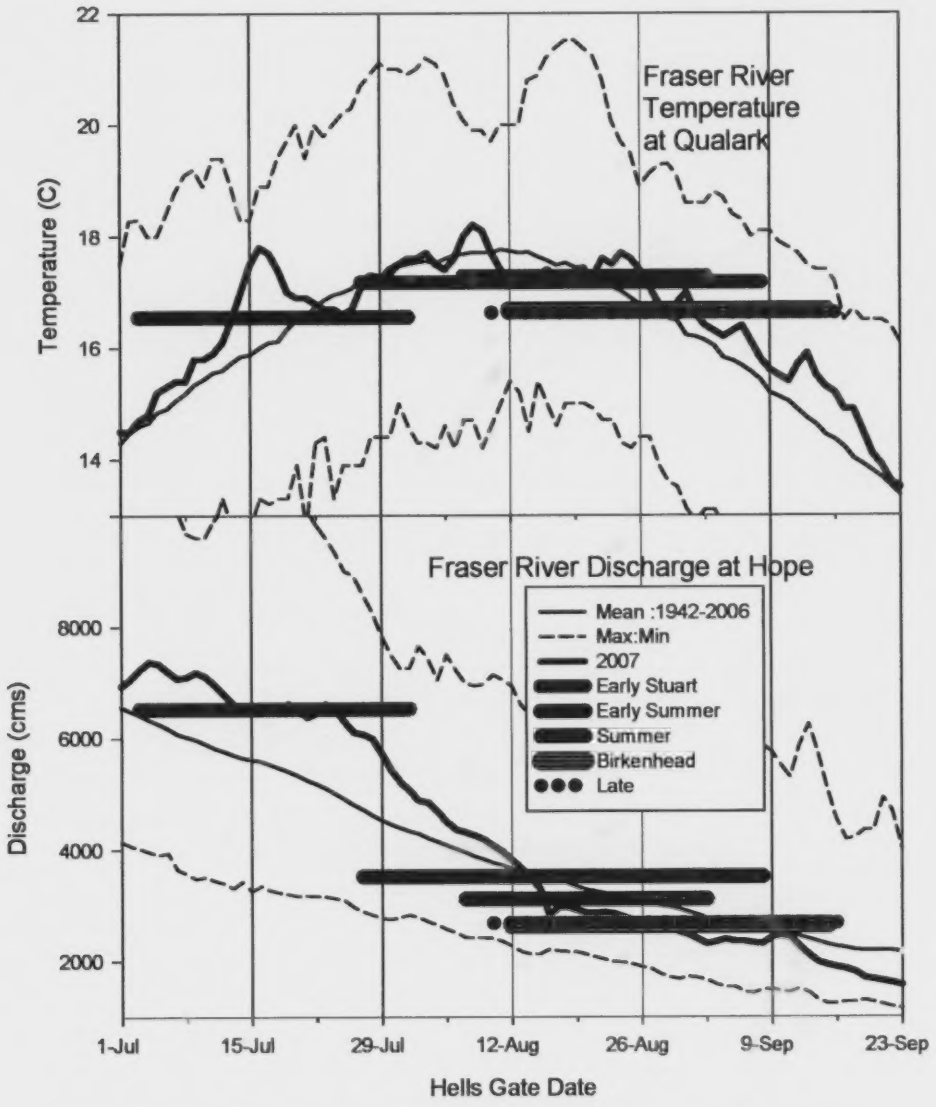

Figure 6. Fraser River temperatures and discharges measured near Hope in 2007, with mean temperatures and discharges during the central 90% of the migration of each management group (excluding Pitt).

Table 7. Differences between estimates (DBEs) of potential spawning escapement (Mission escapement minus catch above Mission) and spawning ground abundance. Preseason predictions are based on long-range forecasts of migration timing and river conditions while in-season estimates are based on in-season observations and short-term projections. The observed DBEs are calculated from final in-season estimates of potential spawning escapement and enumerated spawning populations.

	Early Stuart		Early Summer [1]		Summer		Late (excld. Birk.)	
	%DBE	pMA	%DBE	pMA	%DBE	pMA	%DBE	pMA
Pre-season prediction *	-66%	1.92	-24%	0.32	0%	0.00	-43%	0.74
In-season prediction **	-51%	1.06	-18%	0.22	0%	0.00	-44%	0.79
Observed ***	-55%	na	-8%	na	-11%	na	-49%	na

1 Early Summer %DBE and pMA values apply to the spawning escapement target for the entire management group including Pitt River sockeye.

* Prediction based on pre-season estimates of migration timing and environmental variables.

** Prediction based on in-season estimates of migration timing and environmental variables.

*** Estimate from Mission-based potential spawning escapement and spawning ground estimates.

D. Mission Escapement

Mission escapement estimates totalled 1,306,000 sockeye, including 13,000 Early Stuart, 144,000 Early Summer, 585,000 Summer, 103,000 Birkenhead and 462,000 Late-run sockeye (Tables 2 and 8).

Table 8. Final in-season estimates of escapement of Fraser River sockeye past Mission in 2007.

Management or Stock Group	Mission Escapement
Early Stuart	12,600
Early Summer	
Chilliwack	5,200
Early Miscellaneous	70,300
Seymour/Scotch	38,200
Pitt	29,800
Total	143,500
Summer	
Chilko	365,100
Quesnel	149,100
Late Stuart/Stellako	70,800
Total	585,000
Birkenhead	102,600
Late	
Late Shuswap/Portage	153,500
Weaver/Cultus	130,900
Harrison/Widgeon	177,600
Total	462,000
Total	1,305,500

V. RUN SIZE, CATCH AND SPAWNING ESCAPEMENT

Table 9 provides an overview of post-season run-size estimates by management group for Fraser sockeye and pink salmon. Included are estimates of catch, spawning escapement and Run-size Adjustment (RSA) [9]. Table 10 provides similar information, but with more detail on individual sockeye stock groups. Figure 7 shows total sockeye abundance by year, while Figures 8 (sockeye) and 11 (pink) show catch, escapement, RSA and exploitation rate by year for a historical perspective. Details of commercial catch distributions of Fraser pinks by area and gear in Canada and the U.S. are provided in Tables 11 and 12. Tables 1 (sockeye) and 2 (pink) in Appendix I show catch in Canadian and U.S. fisheries, spawning escapement, RSA and run size over the last four cycle years, while Tables 3 (sockeye) and 4 (pink) in Appendix I show geographic breakdowns of Canadian First Nations catch. Sockeye salmon escapements since 1938 are summarized by management group in Figure 10, and by stock for the last four cycle years in Table 5 in Appendix I. Table 6 in Appendix I reports production data for Fraser pink salmon since 1961.

A. Sockeye Summary

The total abundance of sockeye salmon in 2007 was 1.5 million fish (Tables 9 and 10). This was the smallest return since 1947 (15 cycle years, Figure 7), about one third the brood year abundance (4.9 million fish in 2003), one quarter of the median pre-season forecast of 6.2 million fish (Table 1) and well below the 90% probability level forecast of 2.2 million fish (Table 1 in Appendix B). Sockeye abundance on this cycle line has increased from a low of 967,000 fish in 1943 to a peak abundance of 12.4 million fish in 1991, stabilised within the 3.6 to 4.9 million range between 1995-2003, and then declined to this year's level.

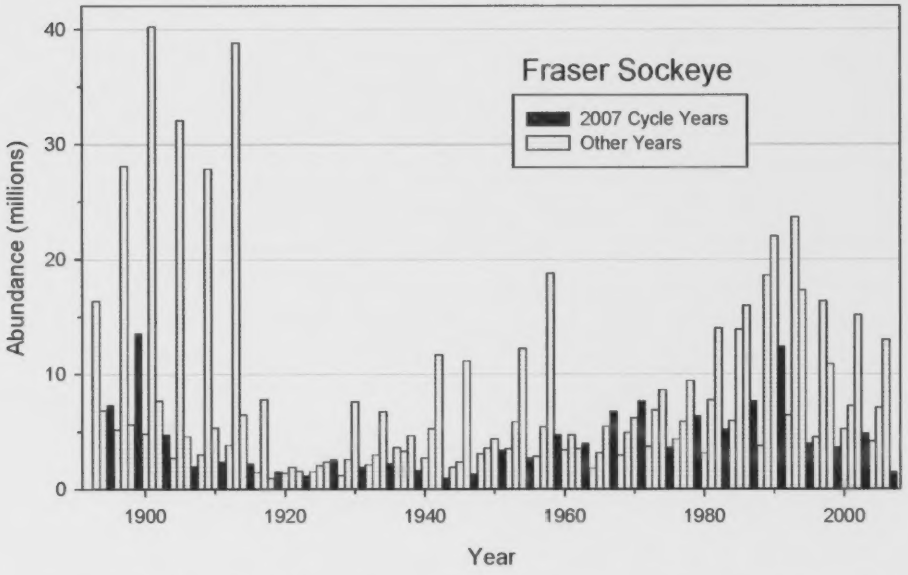

Figure 7. Total run size of Fraser River sockeye salmon between 1893-2007. Returns on the 2007 cycle are emphasized.

[9] Run-size Adjustments (RSAs) are additions to the total return in cases when there is evidence that more fish returned than were accounted for in catch and escapement, e.g., evidence of en route mortality, incomplete spawning ground assessments. The focus of RSAs is on providing the best assessments of total returns, i.e., recruitment. Models that relate recruitment and spawning stock are used to develop both pre-season abundance forecasts and escapement policy. Staff work with the Fraser Technical Committee to provide recommendations to the Fraser Panel about how RSAs are assigned and corresponding best estimates of total return. PSC staff, Technical Committee members and DFO staff are collaborating in the development of a formal process and criteria for determining RSAs.

The total catch of 376,000 fish was about 25% of the run (Tables 9 and 10). This exploitation rate is consistent with the trend towards lower exploitation rates observed since the mid 1990s (Figure 8) due to Canada's rebuilding strategy and conservation concerns for Late-run sockeye and other stocks. The adult spawning escapement of 887,000 fish was 59% of the run while the RSA of 245,000 fish was 16% of the run.

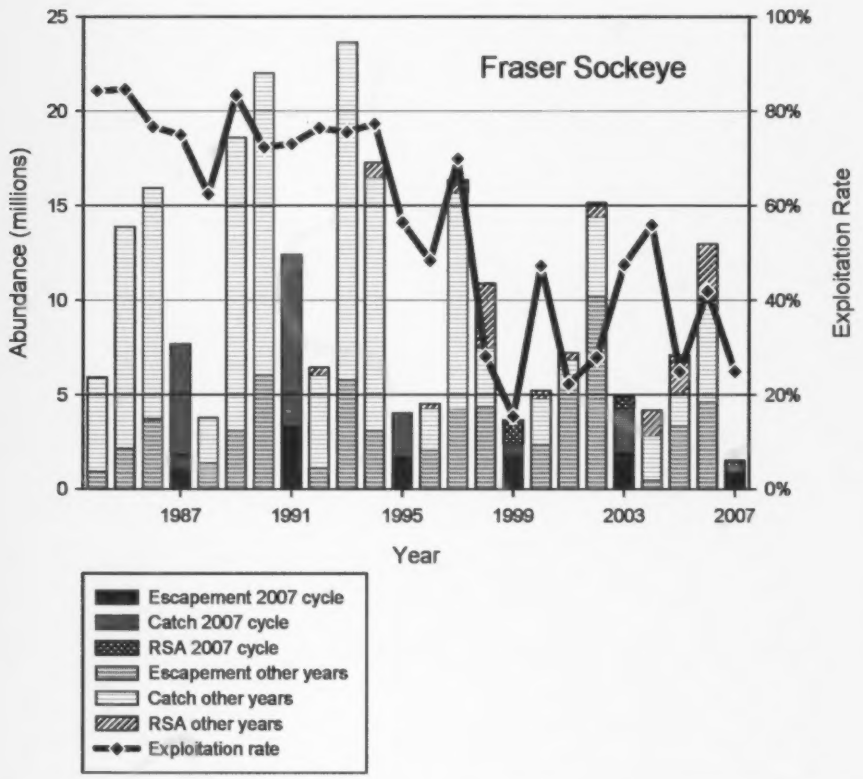

Figure 8. Total run size, catch, escapement, run-size adjustment (RSA) and exploitation rate for Fraser River sockeye salmon between 1984-2007, with returns on the 2007 cycle emphasized.

Of the total catch, 199,000 fish were caught in Canada, 142,000 fish in the U.S. and 35,000 fish in test fisheries (Table 9). Almost all the Canadian catch was taken in First Nations fisheries (197,000 fish), while the commercial catch was zero due to the complete absence of commercial openings in 2007. Washington State fishers caught only 3,400 fish as by-catch in pink-directed Treaty Indian fisheries. These sockeye were not sold but were used for Ceremonial and Subsistence purposes. An unusually large proportion of the run was caught in Alaska (9%, 139,000 fish) and constituted the majority of the U.S. sockeye catch.

The total return of Early Stuart sockeye was 13,000 adults (Table 9), or 29% of the median pre-season forecast. This total included 900 fish caught in Fraser River First Nations fisheries and 100 fish caught in test fisheries, leaving 5,300 fish for spawning and a RSA of 6,400 fish. The total exploitation rate for Early Stuart sockeye was 8%.

Early Summer returns totalled 195,000 adult sockeye, 28% of the median pre-season forecast. The Early Miscellaneous group consisting largely of North Thompson stocks was the largest contributor to this run. Catches of Early Summer-run sockeye totalled 53,000 fish, resulting in an overall exploitation rate of 27%. Spawning escapements totalled 123,000 adults and RSAs totalled 19,000 fish. No RSA is estimated for Pitt River sockeye because they spawn below Mission and therefore no DBE estimate is available on which to base a RSA.

Table 9. Post-season estimates of catch, escapement, run-size adjustment and run size for Fraser River sockeye (by management group) and pink salmon in 2007.

	Fraser Sockeye							Fraser Pinks	
	Early Stuart	Early Summer	Summer	Birken -head	Late	Total	% of Run	Total	% of Run
CANADIAN CATCH									
Panel Area	0	0	0	0	0	0	0%	0	0%
Non-Panel Areas	0	0	0	0	0	0	0%	1,900	0%
Commercial Catch	**0**	**0**	**0**	**0**	**0**	**0**	0%	**1,900**	0%
Marine FSC	0	4,400	17,000	4,400	17,100	42,900	3%	5,900	0%
Fraser River FSC	900	13,700	116,300	3,400	19,700	154,000	10%	11,700	0%
Economic Opportunity	0	0	0	0	0	0	0%	309,300	3%
First Nations Catch	**900**	**18,000**	**133,300**	**7,800**	**36,800**	**196,900**	13%	**326,900**	3%
Marine Recreational	0	0	100	0	100	200	0%	59,200	
Fraser Recreational	0	0	0	0	0	0	0%	18,000	
Charter	0	0	0	0	0	0	0%	0	
ESSR	0	0	0	0	2,100	2,100	0%	0	
Non-commercial Catch	**0**	**0**	**100**	**0**	**2,200**	**2,300**	0%	**77,200**	1%
Canadian Total	**900**	**18,100**	**133,400**	**7,800**	**39,000**	**199,200**	13%	**406,100**	4%
UNITED STATES CATCH									
Treaty Indian	0	0	0	0	0	0	0%	210,100	2%
All Citizen	0	0	0	0	0	0	0%	158,100	1%
Commercial catch	**0**	**0**	**0**	**0**	**0**	**0**	0%	**368,200**	3%
Ceremonial	0	200	700	600	1,800	3,400	0%	400	
Recreational	0	0	0	0	0	0	0%	26,500	
Non-commercial Catch	**0**	**200**	**700**	**600**	**1,800**	**3,400**	0%	**26,900**	0%
Washington Total	0	200	700	600	1,800	3,400	0%	395,100	4%
Alaska	0	30,600	52,800	33,400	22,200	139,000	9%	0	0%
United States Total	**0**	**30,800**	**53,500**	**34,000**	**24,100**	**142,400**	9%	**395,100**	4%
TEST FISHING CATCH									
Canada	0	1,600	7,000	900	3,800	13,400	1%	23,600	
United States	0	1,200	4,900	400	1,900	8,400	1%	1,600	
Commission (Panel Areas)	100	2,800	12,000	1,300	5,700	21,800	1%	25,100	0%
Canada (non-Panel Areas)	0	1,300	5,800	1,600	4,300	13,000	1%	13,700	0%
Test Fishing Total	**100**	**4,000**	**17,800**	**2,900**	**10,000**	**34,800**	2%	**38,800**	0%
TOTAL CATCH, ESCAPEMENT, DBEs AND RUN									
Total Catch in All Fisheries	1,000	52,900	204,700	44,800	73,000	376,400	25%	839,900	8%
Adult Spawning Escapement	5,300	123,000	431,000	98,500	229,100	887,000	59%	10,160,100	92%
Jack Spawning Escapement	0	400	1,200	100	200	1,900	0%	0	0%
Run-Size Adjustment	6,400	18,900	0	0	219,600	244,900	16%	0	0%
Total Abundance	**12,700**	**195,300**	**637,000**	**143,300**	**521,900**	**1,510,300**	100%	**11,000,000**	100%
Gross Escapement	12,700	156,000	548,600	101,900	470,800	1,289,900		0	
Total Catch in All Fisheries	8%	27%	32%	31%	14%	25%		8%	
Spawning Escapement	42%	63%	68%	69%	44%	59%		92%	
Run-Size Adjustment	50%	10%	0%	0%	42%	16%		0%	
Total Abundance	100%	100%	100%	100%	100%	100%		100%	

The abundance of Summer-run sockeye was 636,000 adults, or 19% of the pre-season forecast of 3.4 million fish. Catches totalled 205,000 fish, resulting in an overall adult exploitation rate of 32%. No RSA was assessed for this management group and 431,000 adults were estimated to have reached the spawning grounds.

For Birkenhead sockeye, the catch, escapement and RSA estimates were 45,000 fish, 99,000 fish and zero fish, respectively, for a total abundance of 143,000 adults. This abundance was 23% of the pre-season forecast.

The return of 522,000 Late-run adults was 34% of the median pre-season forecast of 1.5 million fish. Catches of Late-run stocks totalled 73,000 fish, representing an exploitation rate of 14%. RSAs totalled 220,000 fish and the spawning escapement was 229,000 adults. Unlike 2005 and 2006, the spawning escapement of Harrison sockeye did not exceed the estimated escapement past Mission.

Table 10. Post-season estimates of catch, escapement, run-size adjustment, run size and exploitation rate for Fraser River sockeye (by stock group) and pink salmon in 2007.

Stock Group	Catch	Spawning Escapement	Run-size Adjustment	Abundance			% of Total Run	Adult Exploitation Rate
				Adult	Jacks	Total		
Sockeye Salmon								
Early Stuart	1,000	5,300	6,400	12,700	0	12,700	1%	8%
Early Summer-run								
Chilliwack	100	2,000	0	2,100	0	2,100	0%	5%
Early Miscellaneous	33,200	54,500	9,200	96,900	400	97,300	6%	34%
Seymour/Scotch	16,800	24,800	9,700	51,300	0	51,300	3%	33%
Pitt	2,700	41,800	0	44,500	0	44,600	3%	6%
Total	52,900	123,000	18,900	194,900	400	195,300	13%	27%
Summer-run								
Chilko	131,400	305,900	0	437,200	900	438,100	29%	30%
Quesnel	44,000	75,100	0	119,100	0	119,100	8%	37%
Late Stuart/Stellako	29,300	50,100	0	79,400	400	79,800	5%	37%
Total	204,700	431,000	0	635,800	1,200	637,000	42%	32%
Birkenhead	44,800	98,500	0	143,300	100	143,300	9%	31%
Late-run								
Late Shuswap/Portage	36,000	62,700	81,200	179,900	0	179,900	12%	20%
Weaver/Cultus	22,100 *1*	38,000 *2*	90,300	150,300	200	150,500	10%	15%
Harrison	15,000	128,500	48,200	191,600	0	191,600	13%	8%
Total	73,000	229,200	219,600	521,900	200	522,100	35%	14%
Total Adults	376,400	887,100	244,900	1,508,500	1,900	1,510,400	100%	25%
Total Jacks	0 *3*	1,900	0	1,900				
Total	376,400	889,000	244,900	1,510,400				
Portion of Total Run	25%	59%	16%	100%				
Pink Salmon								
Total	839,900	10,160,100	0	11,000,000	0	11,000,000		8%
Portion of Total Run	8%	92%	-	100%				

1 Catch of Weaver Creek sockeye includes an ESSR catch of 2,147 sockeye.

2 Spawing escapement estimate of Cultus sockeye includes 151 individuals captured as brood stock.

3 Jack ratio's were not estimated for fisheries; estimates include only those jacks that were actually sampled and are therefore underestimates.

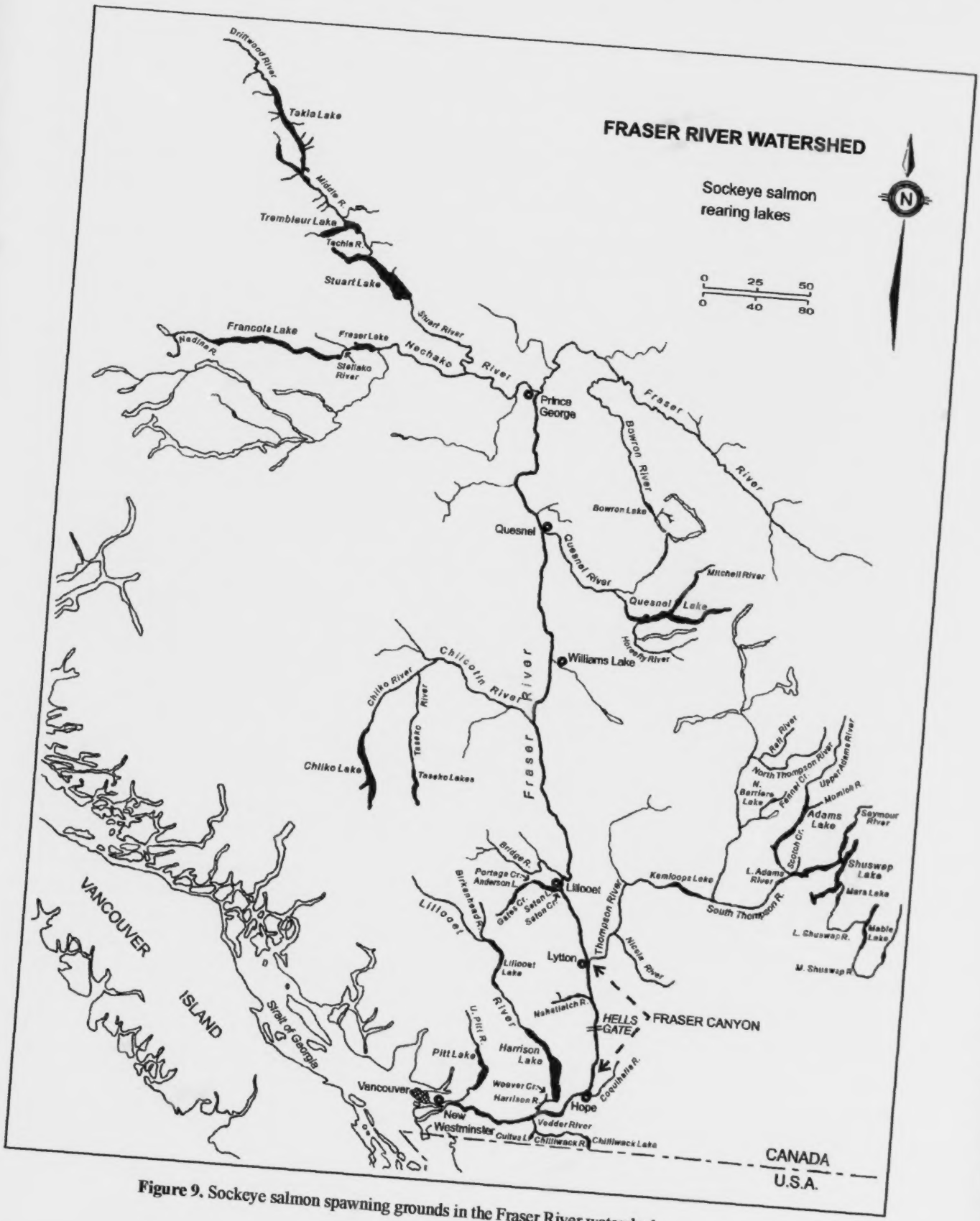

Figure 9. Sockeye salmon spawning grounds in the Fraser River watershed.

i. Sockeye Spawning Escapement

Sockeye spawning escapements to the Fraser River watershed (Figure 9) are described separately here because they are the product of post-season assessments conducted annually by DFO, and therefore are not a Panel responsibility and neither are the data available during Panel management. These estimates are used post-season to assess whether spawning escapement targets have been achieved and to generate final estimates of abundance on a stock and management group basis. Spawning escapement estimates are essential for post-season reporting and are an important constituent of historical data used to forecast future abundances. Data collected on the spawning grounds (e.g., scales, otoliths, tissue, length, sex) are used to partition returns by age, provide information on freshwater and marine growth, and assist in post-season evaluations of stock identification and stock monitoring programs conducted by PSC staff.

In 2007, adult sockeye spawners (primarily age 4 and age 5 fish) totalled 887,000 fish. This escapement was 55% below the brood year (2003) escapement of 2.0 million adult sockeye. Reductions in spawning escapement relative to the brood year were distributed over virtually every sockeye population within the Fraser River watershed, with particular weakness in the escapement of age 4 sockeye. The most severe reductions were observed for Chilko (50% of the brood year escapement), Quesnel (respectively 36% and 11% of brood year escapements for Horsefly and Mitchell Rivers) and Late South Thompson spawning populations (15% of the brood year escapement to Adams River). In contrast, escapements of Early Summer sockeye to Raft River and Fennel Creek were 143% and 123% of the brood year escapement, respectively.

In comparison to previous escapements on the 2007 cycle line by management group (Figure 10), the escapement in 2007 was: (1) the lowest escapement to the Early Stuart system since 1963; (2) similar to historic escapements since the mid 1940s for Early Summer sockeye; (3) the lowest Summer-run escapement since 1971; (4) within the range of Birkenhead observations since 1987 and larger than pre-1987 escapements; and (5) the lowest escapement of Late-run sockeye since 1975. Compared to pre-season escapement targets (Table 1), the observed spawning escapement of Early Stuart sockeye (Table 9) was only 12% of the pre-season target, and for the remaining management groups was 32-45% as large as the pre-season targets.

Poor sockeye escapement to the Fraser River watershed in 2007 cannot be ascribed to excessive commercial harvest or unusually large en route mortality in 2007, or to unusually low escapements in the brood year. With no commercial sockeye-directed fisheries in Panel Areas, limited opportunities in Canadian First Nations fisheries and even including the large catch in Alaska, the exploitation rate was only 25% of the run. Migration conditions in the Fraser River were generally close to historical averages, with no evidence from field observations of significant numbers of dead or moribund fish en route. Furthermore, the escapement of 2.0 million sockeye in the brood year should have facilitated a high level of adult production for 2007, assuming normal environmental conditions and marine survival rates.

Marine area conditions were drastically unfavourable for juvenile sockeye that entered the ocean in 2005, however, and the majority of these fish would have returned in 2007 to spawn as age 4 adults. This incidence of poor marine survival was not limited to Fraser River sockeye. Many other salmonid populations throughout the Pacific northwest were adversely impacted by the unfavourable marine conditions that persisted throughout 2005.

Overall spawning success of adult female sockeye within the Fraser River watershed in 2007 was 96%, slightly lower than the 98% success rate observed in the brood year. The overall effective female spawning population in 2007 totalled 446,000 fish, which was 43% of the effective female population in the Fraser River watershed in 2003.

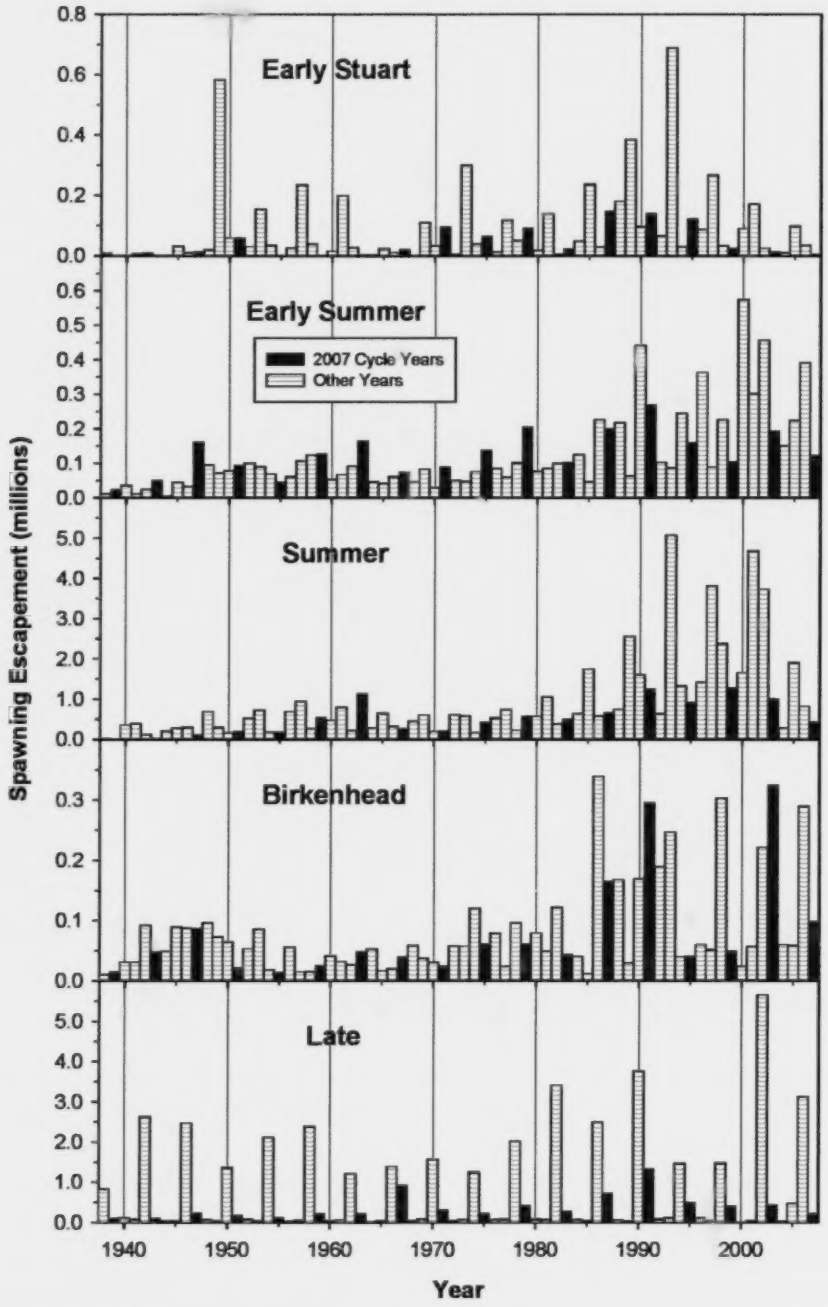

Figure 10. Adult spawning escapement of Fraser River sockeye salmon by year for each management group, with escapements on the 2007 cycle emphasized.

B. Pink Summary

Because the spawning population of Fraser pink salmon is not directly estimated, DBE and RSA estimates are not available and neither is a run-size estimate that is comparable to the post-season estimate calculated for Fraser sockeye. Instead, the total catch of 839,000 Fraser pink salmon in all fisheries was subtracted from the in-season run-size estimate of 11.0 million fish, leaving an indirect spawning escapement estimate of 10.2 million fish (Tables 9 and 10). This run-size estimate is 56% of the median pre-season forecast of 19.6 million fish (Table1).

Returns of Fraser pink salmon (Figure 11) have shown considerable variation in recent years, with the lowest return since 1965 occurring in 1999 (3.6 million fish), followed four years later by the largest return since at least 1959 (26 million fish). The 2007 return was near the average since 1959 (11.5 million fish) and 73% of the more recent average since 1979 (15.2 million fish).

The 8% exploitation rate on Fraser pinks in 2007 is consistent with recent trends. There has been a pronounced reduction in pink salmon exploitation rates, with an average of 8% since 1999 compared to 61% between 1959 and 1997. The low exploitation rates are partly due to conservation concerns for Late-run sockeye that co-migrate with pink salmon, but also reflect the impacts of low consumer demand and market value for pink salmon, and rising fuel costs. These low harvest levels have resulted in substantially increased spawning escapements of Fraser pinks in recent years.

Of the total Fraser River pink salmon catch, 406,000 fish were caught in Canada, 395,000 fish in the U.S. and 39,000 fish in test fisheries (Table 9). The Canadian catch included a First Nations catch of 327,000 fish (mostly in Economic Opportunity fisheries), recreational catch of 77,000 fish, and commercial catch of only 1,900 fish (Table 11). The U.S. catch included a commercial catch of 368,000 fish (Table 12), recreational catch of 27,000 fish and ceremonial catch of about 400 fish.

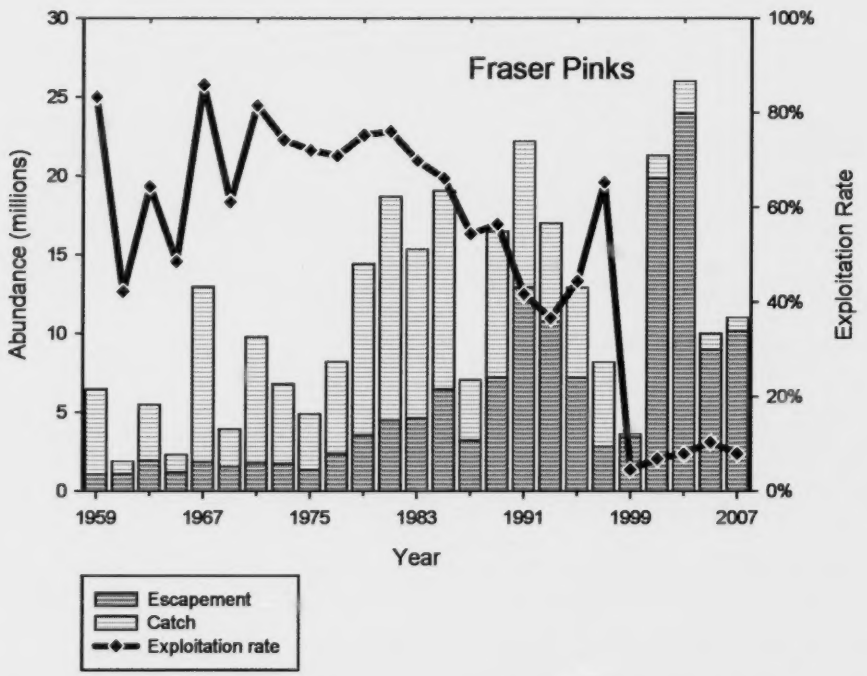

Figure 11. Total run size, catch, escapement and exploitation rate for Fraser River pink salmon between 1959-2007.

Table 11. Canadian commercial catches of Fraser River pink salmon by gear type, license designation and statistical area during the 2007 fishing season. *

Fishery	Purse Seine		Gillnet			Troll			
Areas	Area A	Area B	Area C	Area D	Area E	Area F	Area G	Area H	Total
Commercial	**0**	**40**	**0**	**20**	**0**	**0**	**330**	**1,500**	**1,900**
Panel Areas	**0**	**0**	**0**	**0**	**0**	**0**	**20**	**0**	**20**
20		0			0		0		0
17, 18, 29		0			0			0	0
121-124 *		0		0			20		20
Non-Panel Areas	**0**	**40**	**0**	**20**	**0**	**0**	**310**	**1,500**	**1,900**
1-10	0		0			0			0
11-16		40		20	0		0	1,500	1,560
124-127 *		0		0			310		310
First Nations Economic Opportunity and Demo Fisheries									**309,300**
Total Catch									**311,200**

* Catch in Area 124 is divided between Panel and Non-Panel Areas.

Table 12. U.S. commercial catches of Fraser River pink salmon by user group, gear type and statistical area during the 2007 fishing season. *

Areas	Troll	Purse Seine	Gillnet	Reefnet	Total
Treaty Indian					
4B, 5 and 6C	0	0	0	0	0
6 and 7	0	124,000	0	0	124,000
7A	0	86,100	0	0	86,100
Total Catch	0	210,100	0	0	210,100
All Citizen					
7	0	76,800	100	37,400	114,300
7A	0	43,800	0	0	43,800
Total Catch	0	120,600	100	37,400	158,100
United States					
Panel Area Total	0	330,700	100	37,400	368,200
Non-Panel Area Total					0
Total Catch					368,200

* Washington catch data from Washington Department of Fish and Wildlife "soft system".

VI. ACHIEVEMENT OF OBJECTIVES

The mandate of the Fraser River Panel is to manage commercial fisheries in Panel Area waters to achieve a hierarchy of annual objectives. In order of importance, the objectives are to: (1) achieve spawning escapement targets for Fraser River sockeye and pink salmon that are set by Canada; (2) achieve targets for international sharing of the TAC as defined in the Treaty or by agreement among the Parties; and (3) achieve domestic catch allocation goals within each country. In the process of achieving these objectives, when planning and conducting fisheries the Panel must consider conservation concerns for other stocks and species of salmon. Panel management is evaluated after each season to determine whether the goals were achieved and to identify potential improvements in data collection programs, assessment methods and management techniques.

A. Escapement

The Panel's first task is to achieve spawning escapement targets as specified by Canada. Spawning escapement targets for Early Stuart, Early Summer, Summer and Late-run sockeye were determined by applying Canada's spawning escapement plan (Appendix B, Table 2) to abundance estimates for each management group. The objective (as a percentage of abundance) established for Summer-run sockeye was also applied to Birkenhead sockeye.

In-season management is based on targets for potential spawning escapement (PSE), which include spawning escapement targets plus MAs. This is partly because the Panel's mandate extends only to commercial fisheries, which have an upriver boundary at Mission, BC, in the lower Fraser River. Furthermore, in-season monitoring of the progress toward PSE targets is more practical because of the large time lags between management actions and salmon arriving on the spawning grounds.

Based on final in-season PSE estimates (i.e., Mission escapement minus First Nations and recreational catches above Mission), in-season PSE targets were achieved only for Birkenhead sockeye (11% over), with the remaining management groups falling short of their targets: Early Stuart - 8% under the target, Early Summer - 14% under, Summer - 20% under, and Late-run sockeye - 12% under (Table 13). The main reason for the PSE shortfalls is that run-size assessments for all summer and later-timed stocks dropped after most First Nations sockeye catches had been taken (Table 2), which meant that in-season estimates of the number of fish available for harvest declined too late to influence fishery decisions (Figure 12). Under these circumstances, the Panel's decision to maintain closures throughout the season of all sockeye-directed fisheries under Panel management was appropriate.

Table 13. Comparison of in-season potential spawning escapement (PSE) targets (i.e., spawning escapement target plus MA) at the time the Panel relinquished control of the last U.S. Panel Area (September 21) and in-season PSE estimates (i.e., Mission escapement minus catch above Mission), for adult Fraser River sockeye salmon in 2007.

		Potential Spawning Escapement					
Management Group	In-season Abundance Estimate	Spawning Escapement Target	Management Adjustment *	Adjusted Target	In-season Estimate**	Difference Fish	Difference %
Early Stuart	13,000	13,000	14,000	13,000	12,000	-1,000	-8%
Early Summer	155,000	155,000	34,000	155,000	133,000	-22,000	-14%
Summer	650,000	600,000	0	600,000	483,000	-117,000	-20%
Birkenhead	100,000	92,000	0	92,000	102,000	10,000	11%
Late	510,000	415,000	328,000	510,000	451,000	-59,000	-12%
Adult sockeye	1,428,000	1,275,000	376,000	1,370,000	1,181,000	-189,000	-14%

* Adjustment of spawning escapement targets to achieve spawning goals. If the spawning escapement target + management adjustment exceeds total abundence, then the target equals the total abundance.

** Mission escapement estimate minus all catch above Mission.

Spawning escapements were well below (34%) the post-season spawning escapement targets for all sockeye management groups(Table 14). For Early Stuart, the spawning escapement target was effectively the entire run. Thus, any catch or en route loss resulted in an escapement below the target level. The spawning ground shortfall is explained by the combination of 1,000 fish caught, primarily in Fraser River First Nations fisheries, and a probable en route loss (i.e., RSA) of 6,400 fish (Table 9).

Early Summer escapement was 29% under the target despite the observed DBE (-8%) being less than half the in-season prediction (-18%, Table 7). The in-season escapement target was the total return, so no fish were available to add as a management adjustment (Table 13). Thus, the shortfall in spawning escapement was due to a combination of probable en route losses (18,900 fish, Table 9) and catch in various fisheries.

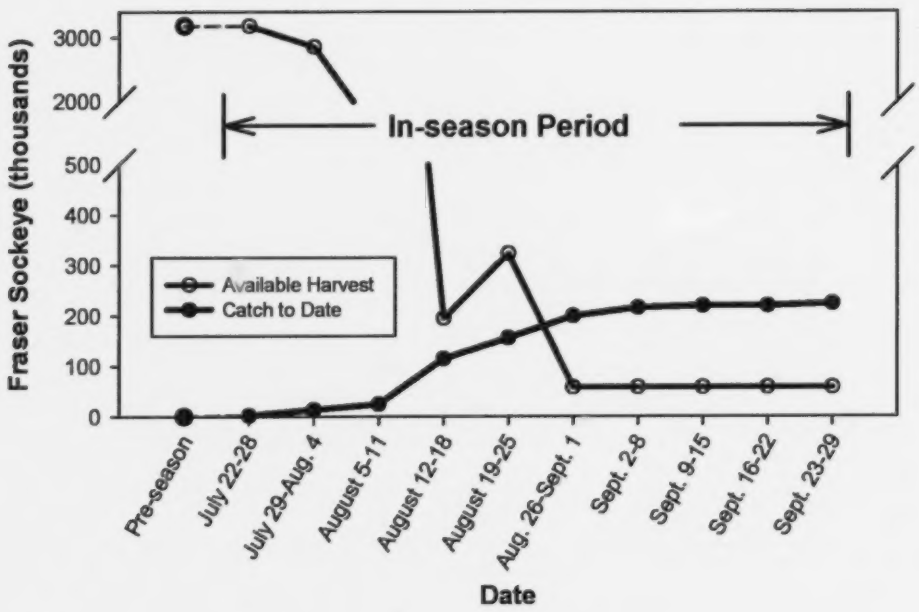

Figure 12. Comparison of available harvest and catch-to-date of Fraser sockeye in all fisheries. The available harvest represents the number of fish that are surplus to spawning escapement requirements and are calculated as run size minus spawning escapement target and management adjustment.

Table 14. Comparison of post-season spawning escapement targets and upriver escapement estimates for adult Fraser River sockeye and pink salmon in 2007. Upriver estimates of sockeye spawners are from spawning ground enumeration programs (DFO), while pink salmon spawners were estimated by subtracting total catch from the in-season abundance estimate.

Management Group	Post-season Abundance Estimate	Spawning Escapement			
		Post-season Target	Upriver Estimate	Difference	
				Fish	%
Early Stuart	12,700	13,000	5,300	-7,700	-59%
Early Summer	195,300	174,000	123,000	-51,000	-29%
Summer	637,000	600,000	431,000	-169,000	-28%
Birkenhead	143,300	135,000	99,000	-36,000	-27%
Late	521,900	415,000	229,000	-186,000	-45%
Adult sockeye	1,510,000	1,337,000	887,000	-449,700	-34%
Pink salmon	11,000,000	6,000,000	10,160,000	4,160,000	69%

More factors are required to explain the Summer-run escapement shortfall of 169,000 fish. First, most of the shortfall can be explained by the magnitude of the catch, primarily by Canadian First Nations fishers. Second, because the post-season DBE (-11%) was larger than the in-season estimate, more fish were assumed to be available for harvest in-season than post-season assessments indicate. Finally, given the observed DBE of -11% or -52,000 fish, the spawning escapement target of 600,000 fish could not have been achieved with the run of 637,000 fish, even if no catch had been taken.

Birkenhead sockeye are managed indirectly, by applying to Birkenhead the Total Allowable Mortality (as a percentage of the total run) that is determined for the Summer run via Canada's spawning escapement plan. The predominant cause of the escapement shortfall for this group was the magnitude of the catch.

For Late-run sockeye, the major cause of the escapement shortfall (-186,000 fish) was that the run size (522,000 fish) was too small to achieve the target (415,000 fish), given the observed DBE of -49%. Another contributing factor was the catch, since there was no harvestable surplus.

Alaskan Purse seine fisheries in District 104 (Noyes Island) primarily target southeast Alaskan pink salmon, but a variable quantity of Fraser sockeye are taken as bycatch. This fishery is not managed for Fraser sockeye nor is it part of the TAC calculation, but sockeye bycatch is sampled for stock composition and post-season estimates of the number of Fraser sockeye harvested are calculated. The magnitude of this bycatch as a proportion of total Fraser sockeye return has averaged 1.1% since 1985, but in 2007 the estimated catch of 139,000 Fraser sockeye constituted a much larger component of total Fraser sockeye abundance (9%, Table 9). Because this catch estimate was not available until after the fishing season, it was not part of in-season run-size estimates. When this catch is included in post-season calculations, it increases the total estimated return and spawning escapement targets. It is therefore included when the achievement of post-season spawning escapement targets is assessed.

B. International Allocation

The Panel's second priority is to achieve the goals for international allocation of the TAC. In accordance with the February 17, 2005, Panel agreement, the TAC calculation is based on the run size and deductions that were available on September 21, when control of the last U.S. Panel Area was relinquished.

With the total abundance estimate of 1.4 million Fraser sockeye, minus deductions for spawning escapement, MA, test fishing catch and Fraser River Aboriginal Fishery Exemption, the TAC at the end of the 2007 in-season period was zero sockeye (Table 15 and Appendix I, Table 7). As part of this calculation and in accordance with Annex IV of the Treaty, the Treaty-defined Aboriginal Fishery Exemption (AFE) of 400,000 fish was reduced to 197,000 fish to match the actual First Nations catch. The First Nations catch was taken in FSC (Food, Social and Ceremonial) fisheries during periods when limited harvest was available or as by-catch in fisheries directed at other species.

With a TAC of zero, the small catch in Washington State exceeded their share. The Washington catch of 3,400 sockeye was by-catch in Treaty Indian fisheries directed at pink salmon. These sockeye were not sold but used for C&S purposes, and will be repaid to Canada in future years. Canada's deviation from their share was zero.

In contrast, the TAC for Fraser pink salmon was 5.0 million fish, with a U.S. share of almost 1.3 million and Canadian share of 3.7 million. Both countries caught far less than their respective shares, with the U.S. catching 890,000 fish less than their TAC and Canada 3.3 million fish less.

Table 15. Total allowable catch and international catch allocation for Fraser River sockeye and pink salmon in 2007. In-season estimates of abundance, spawning escapement target, management adjustment and test fishing catch at the time the Panel relinquished control of the last U.S. Panel Area (September 21) were used, in accordance with the 2005 revised Annex IV of the Treaty.

		Sockeye	Pink
TOTAL ALLOWABLE CATCH			
In-season Total Run Size		1,428,000	11,000,000
Deductions			
In-season Spawning Escapement Target		1,275,000	6,000,000
In-season Management Adjustment		376,000	-
Aboriginal Fishery Exemption		197,000	-
In-season Test Fishing Catch		36,000	0
Total Deductions:		1,884,000	6,000,000
Total Allowable Catch:	*1, 2*	0	5,000,000
UNITED STATES			
Washington Share			
Washington Share of TAC	*3*	0	1,285,000
Payback		0	0
Total Share:		0	1,285,000
Washington Catch	*4*	3,400	395,100
Deviation:		-3,400	-889,900
In-season Alaska Catch Estimate		0	0
CANADA			
Canadian Share + Aboriginal Fishery Exemption		197,000	3,715,000
Canadian Catch excluding ESSR Catch		197,000	406,100
Deviation:		0	-3,308,900

1 The TAC was calculated in accordance with the Feb. 18, 2005 Commission Guidance and the 2005 revised Annex IV, Chapter 4 of the Pacific Salmon Treaty.

2 TAC may not equal the total run minus total deductions shown due to adjustments required when the run size of individual management groups is less than the nominal deductions. A more detailed TAC calculation showing these intermediate calculations is shown in Appendix I.

3 United States share according to revised Annex IV of the Pacific Salmon Treaty:
Sockeye: 16.5% of the TAC - payback (maximum 5% of share).
Pink: 25.7% of the TAC - payback (maximum 5% of share).

4 Fraser sockeye caught in Washington were by-catch in pink salmon-directed Treaty Indian fisheries and were used for Ceremonial and Subsistence purposes.

C. Domestic Allocation

The third priority of the Panel is to achieve domestic allocation goals as specified by the Parties. While the Panel manages all commercial fisheries directed at Fraser River sockeye and pink salmon in Panel Area waters (Figure 1), Canada has sole responsibility for regulating several of its fisheries including commercial net and troll fisheries in non-Panel areas such as Johnstone Strait, and First Nations and recreational fisheries in all fishing areas. Thus, achievement of Canadian domestic allocation goals requires coordination between Panel and non-Panel regulatory actions.

Given the very low catch of Fraser sockeye in Washington (entirely in Treaty Indian pink-directed fisheries), and the absence of sockeye-directed commercial fisheries in Canada, the achievement of domestic sockeye allocations in 2007 will not be assessed here.

With respect to domestic allocations of Fraser pink salmon, there was only one Canadian fishery directed at Fraser pinks (1,500 pinks caught in an Area 18 troll fishery with non-retention of sockeye), so domestic sharing goals were unachievable. In the U.S., Treaty Indian fishers caught 432,000 fish less than their share of the U.S. TAC, while All Citizen fishers caught 458,000 fish less (Table 16).

Table 16. Achievement of domestic catch goals in Washington for Fraser pink salmon in 2007.

	Actual Catch		Share of TAC		
User Category	Fish	%	Fish	%	Deviation
Treaty Indian *	210,500	53%	642,500	50%	-432,000
All Citizen **	184,600	47%	642,500	50%	-457,900
Washington Total:	395,100	100%	1,285,000	100%	-889,900

* Treaty Indian catch includes commercial and ceremonial catches.

** All Citizen catch includes commercial and recreational catches.

D. Conservation of Other Stocks and Species

With the exception of non-Fraser pinks, catches of non-target stocks and species in Panel Area fisheries directed at Fraser River sockeye and pink salmon were small in 2007 (Table 17). This is largely due of the lack of sockeye-directed commercial fisheries. By-catches of non-Fraser salmon in commercial net fisheries regulated by the Fraser River Panel totalled zero sockeye and 91,000 pink salmon, with about 60% of these pink salmon from Washington stocks and 40% from Canadian south-coast stocks. Catches of other Fraser and non-Fraser salmon included 2,700 chinook, 590 coho, 4 chum and zero steelhead.

Table 17. Catch estimates for non-Fraser sockeye and pink salmon and of other salmon species in commercial fisheries regulated by the Fraser River Panel in 2007.

	Non-Fraser		Fraser and Non-Fraser			
Area and Gear	Sockeye	Pink	Chinook	Coho	Chum	Steelhead
United States *						
Areas 4B, 5 and 6C Net	0	0	0	70	4	0
Areas 6, 7 and 7A Net	0	91,000	2,700	520	0	0
Total	0	91,000	2,700	590	4	0
Canada **						
Area 20 Net	0	0	0	0	0	0
Area 29 Net	0	0	0	0	0	0
Total	0	0	0	0	0	0
Total	0	91,000	2,700	590	4	0

* Estimates are from the WDFW "soft-system".

** Estimates are from DFO in-season hail program.

VII. ALLOCATION STATUS

As a result of a small C&S (Ceremonial and Subsistence) bycatch of sockeye in pink-directed fisheries, the U.S. owes a payback of 3,400 Fraser sockeye to Canada in future years (Table 18). There are no paybacks due for Fraser pink salmon.

Table 18. Allocation status of Fraser River sockeye and pink salmon for 1999-2007. After 2007, the U.S. owed 3,400 Fraser sockeye, but no paybacks were due for Fraser pink salmon.

	Sockeye								
	1999	2000	2001	2002	2003	2004	2005	2006	2007
TOTAL ALLOWABLE CATCH									
Total Run Size	3,643,000	5,217,000	7,213,000	15,312,000	5,408,000	4,438,000	8,770,000	8,715,000	1,428,000
Escapement and other deductions	3,438,000	3,198,000	6,132,000	9,568,000	3,159,000	3,663,000	6,124,000	6,457,000	1,428,000
Total Allowable Catch:	205,000	2,019,000	1,081,000	5,744,000	2,249,000	775,000	2,646,000	2,258,000	0
UNITED STATES									
Washington Catch	20,000	494,000	241,000	449,000	244,000	197,000	201,000	708,000	3,400
Washington Share (excld payback) *	46,000	412,000	241,000	496,000	371,000	128,000	437,000	373,000	0
Deviation:	-26,000	82,000	0	-47,000	-127,000	69,000	-236,000	335,000	3,400
Cumulative Allocation Status:	**-26,000**	**56,000**	**56,000**	**9,000**	**0 ****	**0 ****	**0 ****	**0 ****	**3,400**
CANADA									
Catch (excluding ESSR)	416,000	1,870,000	1,197,000	3,508,000	1,918,000	2,013,000	1,143,000	4,565,000	197,000
Share + Aboriginal Exemption	390,000	1,952,000	1,197,000	n/a	2,278,000	1,047,000	2,609,000	2,285,000	197,000
Deviation:	26,000	-82,000	0	n/a	-360,000	966,000	-1,466,000	2,280,000	0

	Pink				
	1999	2001	2003	2005	2007
TOTAL ALLOWABLE CATCH					
Total Run Size	3,616,000	21,293,000	26,000,000	10,000,000	11,000,000
Escapement and other deductions	3,468,000	19,881,000	7,843,000	6,010,000	6,000,000
Total Allowable Catch:	148,000	1,412,000	18,157,000	3,990,000	5,000,000
UNITED STATES					
Washington Catch	17,000	445,000	811,000	338,000	395,100
Washington Share *	38,000	445,000	4,666,000	1,025,000	1,285,000
Deviation:	-21,000	0	-3,855,000	-687,000	-889,900
Cumulative Allocation Status:	**-21,000**	**-21,000**	**0 ****	**0 ****	**0 ****
CANADA					
Catch	131,000	967,000	1,216,000	637,000	406,100
Share	110,000	967,000	13,491,000	2,965,000	3,715,000
Deviation:	21,000	0	-12,275,000	-2,328,000	-3,308,900

* Washington share of the TAC according to Annex IV of the Pacific Salmon Treaty:

1999: Shall not exceed 22.4% for Fraser sockeye and 25.7% for Fraser pinks.

2000: Shall not exceed 20.4% for Fraser sockeye.

2001: Washington share equals Washington catch for Fraser sockeye and pink salmon, by agreement between the Parties on June 12, 2002.

2002: By a Feb. 12-13, 2003 Panel agreement, the Washington share equals the Washington catch plus the maximum payback (449,000 + 47,000 = 496,000). By agreement, no paybacks generated for 2003.

2003: Shall not exceed 16.5% for Fraser sockeye minus the payback, and 25.7% for Fraser pinks plus the payback. By agreement, no paybacks generated for 2004.

2004: Shall not exceed 16.5% for Fraser sockeye. By agreement, no paybacks generated for 2005.

2005: Shall not exceed 16.5% for Fraser sockeye and 25.7% for Fraser pinks. Panel interpretation of Feb. 18, 2005 Commission Guidance, item 1c(ii), was that no paybacks resulted from catch overages or underages in 2005 and so no paybacks generated for 2006.

2006: Shall not exceed 16.5% for Fraser sockeye & 25.7% for Fraser pinks. By agreement (Feb. 14, 2008), no paybacks generated for 2007.

2007: Shall not exceed 16.5% for Fraser sockeye and 25.7% for Fraser pinks.
The U.S. catch of 3,400 Fraser sockeye were by-catch in pink-salmon directed fisheries and were landed as ceremonial catch.

** By Panel agreement, no paybacks are to be carried forward.

VIII. APPENDICES

APPENDIX A: GLOSSARY OF TERMS AND ABBREVIATIONS

Bayesian inference: Statistical inference which allows pre-season forecasts of run size, diversion rate, and migration timing to be updated with in-season observations. Uncertainty in the estimates decreases as more in-season data become available. The name "Bayesian" comes from the frequent use of Bayes' theorem in the inference process.

Difference between estimates (DBE): Difference between estimates of potential spawning escapement (PSE) and spawning escapement. Sources for DBEs include en route mortality and errors (bias and imprecision) introduced through the estimates of Mission escapement, spawning ground escapement, First Nations and recreational catches above Mission and stock composition. Historical DBE values are used to generate Management Adjustment (MA) models, which use estimates of migration timing and river conditions to predict the DBEs likely to be observed in the current year. DBEs may be represented as a number of fish or a percentage of the potential spawning escapement, and are related to pMAs through the formula: pDBE = ((1/(1+pMA))-1, where pDBE is the %DBE represented as a proportion.

Demonstration (Demo) fishery: Commercial Fraser River First Nations fishery in the BC Interior (BCI).

Diversion rate: Proportion of the salmon run that migrates through Johnstone Strait (northern approach) as opposed to Juan de Fuca Strait (southern approach). Estimates may be in weekly time steps or a value for the entire migration.

Economic Opportunity (EO) fishery: Commercial Fraser River First Nations fishery in the lower Fraser River or Strait of Georgia.

Fishery Simulation Model: A pre-season model that allows the Panel to evaluate the impacts of various fishery options on the achievement of management objectives, given such pre-season expectations as abundance, stock composition, migration timing, diversion rate, catch and escapement objectives, and management adjustments.

Gross Escapement: In-season estimates are calculated by summing the escapement past Mission plus First Nations, recreational and ESSR (Excess Salmon to Spawning Requirements) catches in the Fraser River below Mission. Post-season estimates are the sum of spawning ground abundances, run-size adjustments (RSAs), and catches in First Nations (FSC and EO), recreational and ESSR fisheries in the Fraser River watershed.

Management Adjustment (MA): Additional fish added to an escapement target for the purpose of increasing the likelihood of achieving the escapement target. MAs are estimated by use of median values from the historical data and by MA models, which use estimates of migration timing and river conditions to predict a proportional adjustment (pMA) to the spawning escapement target. The pMA is then multiplied by the spawning escapement target to predict the numerical MA that is likely required to achieve the target. MAs are calculated bi-weekly during the fishing season using observed and predicted river conditions. DBEs are related to pMAs through the formula: pMA = ((1/(1+pDBE))-1, where pDBE is the %DBE represented as a proportion.

Management group or **Run-timing group**: Aggregates of Fraser River sockeye salmon stocks that are used in Fraser Panel management, i.e., Early Stuart, Early Summer, Summer, Birkenhead and Late-run groups.

Migration date or 50% date: Dates when 50% of the total run would have passed a certain geographical location, if it is assumed that all fish migrated via that route.

Area 20 date: An index of marine migration timing, assuming the entire run migrated through Canadian Fishery Management Area 20 in Juan de Fuca Strait.

Mission date: An index of in-river migration timing, it is the date when 50% of the total Mission escapement (usually identified by individual stock or stock group) is estimated to have passed Mission.

Reconstructed Mission date: An index of in-river migration timing based on the reconstructed run to Mission (Mission escapements plus catches seaward of Mission). Generally not available for Late-run stocks for which a portion of the run is expected to delay prior to entering the Fraser River.

Mission Escapement: PSC estimates of the daily number of fish that migrate upstream past the hydroacoustic field station at Mission, B.C. Mission escapement is primarily estimated by hydroacoustic methods, but at times (early and late in the season) is supplemented by expanded CPUE estimates derived from in-river and marine test fisheries.

Potential Spawning Escapement (PSE)

Potential spawning escapement target: In-season target for PSE by management group, where the PSE is the sum of the spawning escapement target plus the management adjustment (MA). May also be called the "Adjusted Spawning Escapement target". The management objective is to achieve the PSE target in-season as measured by the potential spawning escapement.

Potential spawning escapement: Mission escapement estimate minus First Nations and recreational catches above Mission. If there were no en route mortalities or estimation errors in Mission escapement, up-river catches, spawning escapement or stock identification, the potential spawning escapement would in theory equal the estimated spawning populations.

Run size: Total abundance or total return of a stock, management group or entire population of Fraser River sockeye or pink salmon.

Run-size adjustment (RSA): An amount often equated to en route loss that is added to estimates of catch and spawning escapement to provide the best estimate of total run size. The assessment of RSAs is based on DBE estimates and other information.

Spawning Escapement

Spawning escapement or Net escapement: Spawning abundance of sockeye salmon as estimated through programs conducted on the spawning grounds, or projected from other data when such programs are incomplete (e.g., Quesnel spawners in 2002). Losses from pre-spawn mortality on the spawning grounds are not accounted for in estimates of total spawner abundance, but are accounted for in estimates of Effective Female spawners.

Spawning escapement target: Target for total adult spawning escapement for each spawning population as defined each year by Canada's Spawning Escapement Plan.

Total Allowable Mortality rule (TAM rule): For each Fraser sockeye management group at different run sizes, Canada's Spawning Escapement Plan specifies the total allowable mortality from all sources, including fishery removals (catch) and en route mortality (represented by the Management Adjustment).

List of abbreviations

ADF&G: Alaska Department of Fish and Game	FSC: "Food, social and ceremonial", as relates to First Nations fisheries
AFE: Aboriginal Fishery Exemption	GSI: Genetic Stock Identification
BC: Province of British Columbia	JS: Johnstone Strait
DBE: Difference between estimates	LGL: A biological consulting company
CPUE: Catch per Unit of Effort	MA: Management Adjustment
DFO: Fisheries and Oceans Canada	MLP: Mandatory Landing Program
DIDSON: Dual-frequency IDentification SONar	M-R: Mark-recapture
EO: Economic Opportunity	pMA: Proportional Management Adjustment
ESSR: Terminal harvest of Weaver Creek sockeye that are "Excess Salmon to Spawning Requirements"	PSC: Pacific Salmon Commission
FRP: Fraser River Panel	RSA: Run-size Adjustment
FRPTC: Fraser River Panel Technical Committee	SET: Spawning Escapement Target
	TAC: Total Allowable Catch
	TAM: Total Allowable Mortality
	WDFW: Washington Department of Fish and Wildlife

APPENDIX B: 2007 PRE-SEASON FORECASTS AND SPAWNING ESCAPEMENT TARGETS FOR FRASER RIVER SOCKEYE AND PINK SALMON

Table 1. Pre-season forecasts for Fraser River sockeye and pink salmon for 2007. (Provided to the Panel by Fisheries and Oceans Canada in April 2007)[5]

Sockeye stock/timing group	Forecast model[b]	Mean Run Size[c]		Probability of Achieving Specified Run Sizes[a]				
		all cycles	2007 cycle	0.1	0.25	0.5	0.75	0.9
Early Stuart	fry	**330,000**	**192,000**	**100,000**	**65,000**	**45,000**	**29,000**	**19,000**
Early Summer		**508,000**	**579,000**	**2,813,000**	**1,328,000**	**690,000**	**389,000**	**231,000**
Bowron	Ricker-pi	44,000	89,000	54,000	37,000	25,000	17,000	12,000
Fennell[f]	RAC	24,000	32,000	796,000	165,000	29,000	5,000	1,000
Gates	power	58,000	25,000	142,000	87,000	51,000	30,000	19,000
Nadina	fry	87,000	127,000	51,000	31,000	18,000	11,000	6,000
Pitt[g]	TSA	71,000	82,000	228,000	131,000	71,000	38,000	22,000
Raft	power	31,000	20,000	101,000	68,000	45,000	29,000	18,000
Scotch	R1C	62,000	20,000	172,000	94,000	48,000	24,000	13,000
Seymour	Ricker-cyc	131,000	184,000	476,000	298,000	188,000	120,000	81,000
Misc[d]	R/S	-	-	793,000	417,000	215,000	115,000	59,000
Summer		**3,782,000**	**2,401,000**	**9,870,000**	**5,878,000**	**3,369,000**	**1,971,000**	**1,261,000**
Chilko	smolt	1,373,000	1,574,000	3,649,000	2,588,000	1,713,000	1,119,000	783,000
Late Stuart	R1C	579,000	92,000	1,113,000	443,000	159,000	57,000	23,000
Quesnel[h]	pooled[h]	1,349,000	103,000	4,538,000	2,458,000	1,242,000	628,000	341,000
Stellako	R1C	481,000	632,000	570,000	389,000	255,000	167,000	114,000
Late		**2,936,000**	**2,166,000**	**6,923,000**	**3,986,000**	**2,143,000**	**1,213,000**	**731,500**
Cultus	smolt-jack	41,000	93,000	14,000	8,000	4,000	1,000	500
Harrison	Ricker-PDO	41,000	66,000	62,000	39,000	22,000	14,000	12,000
Late Shuswap[j]	pooled[j]	2,081,000	1,482,000	3,753,000	2,011,000	994,000	504,000	276,000
Portage	power	39,000	24,000	170,000	85,000	39,000	20,000	11,000
Weaver	fry	375,000	173,000	1,081,000	668,000	416,000	269,000	188,000
Birkenhead	power	359,000	328,000	1,467,000	929,000	543,000	352,000	216,000
Misc Shuswap[e]	R/S	-	-	160,000	97,000	55,000	29,000	17,000
Misc. non-Shuswap[e]	R/S	-	-	216,000	149,000	70,000	24,000	11,000
TOTAL		**7,556,000**	**5,338,000**	**19,706,000**	**11,257,000**	**6,247,000**	**3,602,000**	**2,242,500**
PINKS	fry-salinity	**12,120,896**	-	**35,775,000**	**26,455,000**	**19,570,000**	**13,908,000**	**10,069,000**

[a] probability that the actual run size will exceed the specified projection

[b] see Table 2 and Cass *et al.* 2006 for model descriptions

(see DFO's 2007/2008 Southern B.C. Salmon IMFP (footnote 5 in this report) for Table 2 and Cass reference)

[c] sockeye: 1948-2003; pink: 1961-2003

[d] unforecasted miscellaneous Early Summer stocks

[e] unforecasted miscellaneous Late stocks

[f] Fennell performance measures of TSA and RAC models were nearly indistinguishable. Brood effective females (5,200) were close to the cycle line average (5,000), as a result the cycle line average model (RAC) was used.

[g] Pitt brood year escapement exceeds the historical range. Use of any escapement based model would be invalid. The best ranking naive model (TSA) was used to forecast Pitt returns.

[h] Quesnel top ranking forecasts (Ricker-fry and R1C) were pooled (weighted average based on SE calculated from retrospective analysis).

[j] L. Shuswap top ranking forecasts (Larkin and RAC) were pooled (weighted average based on SE calculated from retrospective analysis).

Model definitions: fry or smolt (juvenile-based power function); Ricker-pi (Ricker function with Pine Island SST covariate); RAC (average recruitment on the cycle line); power (power function); TSA (time series average of recruitment); R1C (recruitment like last generation); Ricker-cyc (Ricker function using cycle line data only); smolt-jack (multiple linear relation between smolt production, jack escapement, and recruitment); Ricker-PDO (Ricker function with Pacific Decadal Oscillation Index).

Table 2. Fraser River sockeye salmon escapement plan (in thousands of fish) for 2007. (Provided to the Panel by Fisheries and Oceans Canada in April 2007).[5]

Stock Group	Run Size Estimate of forecasted stocks	Run Size Reference Points		Total Mortality Rate Guidelines	Total Allowable Mortality at Run Size	Escapement Target at Run Size	Management Adjustment (a)		Exploitation Rate after MA
Early Stuart	45	- 108 270	108 270	0% 0 - 60% 60%	0%	45	69%	31	0%
Early Summer	690	- 174 436	174 436	0% 0 - 60% 60%	60%	276	48%	131	41%
Summer	3,369	- 600 1,500	600 1,500	0% 0 - 60% 60%	60%	1,348	2%	27	59%
Birkenhead and Birkenhead-type Lates (b)	613			0% 0 - 60% 60%	60%	245			60%
true-Late (excl. Birk. Type)	1,530	- 415 1,037	415 1,037	0% 0 - 60% 60%	60%	612	94%	575	22%
Cultus	4								10%-12%

APPENDIX C: 2007 FRASER RIVER PANEL MANAGEMENT PLAN PRINCIPLES AND CONSTRAINTS (final July 13, 2007)

1. Fisheries and Oceans Canada (DFO) have provided the Panel with run-size forecasts for Fraser River sockeye salmon by run timing group and for Fraser River pink salmon. For pre-season planning purposes, the Panel used the 50% probability (p) levels of abundance. There is a 50% probability that the Fraser sockeye salmon return will reach or exceed 6,247,000 fish, and a 50% probability that the Fraser pink salmon return will reach or exceed 19,570,000 fish.

2. The Panel's first priority for 2007 is to achieve conservation objectives for all stocks, including Late-run sockeye[10] objectives as indicated in the document, "Guidelines for Pre-season Fraser Sockeye Fishing Plans to Address Late-Run Concerns".

3. The Panel has adopted a management approach for Late-run sockeye that presumes that similar to recent years, Late-run sockeye will enter the Fraser River early and a significant proportion will not survive to spawn. Unlike recent years, however, the Panel may update its assumptions about Late-run upstream timing and mortality based on advice from PSC staff, during the in-season management period.

4. TAC and international shares will be calculated according to the February 18, 2005 Commission Guidance and the 2005 revised Annex IV, Chapter 4, of the Pacific Salmon Treaty, which limits the United States harvest (in Washington State) to 16.5% of the total allowable catch (TAC) of Fraser River sockeye salmon. Based upon the 50% p levels of abundance, for the purposes of computing TAC by stock management grouping in 2007, the Panel agreed that the Fraser River Aboriginal Exemptions were as follows: Early Stuart sockeye, 0 fish, Early Summer sockeye, 42,900 fish; Summer-run sockeye, 269,500 fish; Birkenhead sockeye, 16,300 fish; and Late-run sockeye, 71,300 fish. There is no available harvest of Early Stuart sockeye at the 50% p level forecast of abundance. With respect to Fraser River pink salmon, under the terms of Annex IV, Chapter 4, of the Pacific Salmon Treaty, the United States share of the TAC is 25.7%. As per Fraser Panel agreement, for the 2007 season there are no paybacks of Fraser River sockeye or pink salmon due from prior years.

5. For planning fisheries, the Panel has adopted 50% probability level forecasts for Early Stuart (45,000 fish), Early Summer-run (690,000 fish), Summer-run (3,369,000 fish), Late-run sockeye (2,143,000), and for Fraser River pink salmon (19,570,000 fish). When sufficient information is available in-season, the Panel will update run size estimates of Fraser River sockeye and pink salmon stocks, as appropriate.

Regulations

i.) If the abundance of Early Summer-run sockeye salmon is tracking at approximately the 50% probability level (690,000 fish) and the abundance of Summer-run sockeye salmon is tracking at approximately the 50% probability level (3,369,000 fish) and the runs arrive at or near normal dates, low impact fisheries would be expected to commence the week of July 22 – 28 in Panel Waters. If the return abundances of Early Summer-run and Summer-run sockeye vary from the 50% probability level forecast, this could change the start dates, and duration of fisheries.

ii.) Fisheries directed at Fraser River pink salmon will be managed in accordance with the Late-run sockeye guidelines.

iii.) The Parties' conservation concerns for other species and stocks will be taken into account throughout the 2007 management season.

[10] Late-run here refers to the Late-run timing group, excluding Birkenhead and a few minor miscellaneous sockeye stocks.

APPENDIX D: GUIDELINES FOR PRE-SEASON FRASER SOCKEYE FISHING PLANS TO ADDRESS LATE-RUN CONCERNS (final July 13, 2007)

The 2007 cycle is the sub-dominant-line cycle for Adams River sockeye. True Late-run sockeye[11] have historically produced somewhat smaller returns on this cycle line than Summer-run sockeye, and Adams/Late Shuswap sockeye are the predominant Late-run stock-group. In the brood year (2003), Late-run stocks exhibited only short term delay in the Strait of Georgia prior to migrating upstream with an August 27 50% migration date at Mission. However, the stocks were not as severely impacted by the early upstream migration behaviour as in some other recent early migration years, resulting in a "true" Late-run spawning escapement approximately 97 percent of the long-term average for the cycle line. The total forecast for Late-run sockeye in 2007 (1,530,000 fish at the 50% p level) is approximately 81% of the average production for the cycle (1955 – 2003). A co-ordinated approach to management will be developed that reflects both Parties sharing the burden of conservation of Late-run sockeye. The 2007 cycle line has also been the largest of the four cycle lines for Cultus sockeye since the mid-70's but the forecast (4,000 fish at the 50% p level) is well below the average pre-early upstream migration return on this cycle of 75,000 fish (1975 – 1995). Therefore, special consideration will be given to help ensure this stock's long-term viability. Additional measures to reduce the fishing impact on Cultus sockeye will be taken by Canada in 2007.

ASSUMPTIONS

1. For fisheries planning purposes, we assumed that Late-run sockeye will continue their post-1995 early upstream migration behaviour. We assumed a difference between estimates of 42.5% based on the midpoint of the average difference between estimates for the years 1998, 1999, 2002 and 2003 (37%) and the prediction of the Management Adjustment model using 2006-2007 cycle line data (but excluding the 2006 data point) and the assumed upstream migration date of August 29 (48%). The August 29 date was based on average Late-run marine timing on the 2006 and 2007 cycle lines, in combination with the average Late-run delay in the Strait of Georgia from 2000 to 2006. The assumed difference between estimates is consistent with en route mortality estimates derived from the application of 2002 and 2003 Late-run sockeye tagging results to upstream timing assumptions in the pre-season planning model.

2. Estimates of abundance, migration timing, etc., for Summer-run and Late-run sockeye, will be provided in-season, however, the timeliness of Late-run abundance and timing updates will depend on the pattern of migration and may not occur during the period of active in-season Panel Area management. PSC staff have developed models to predict the in-river migration timing and associated en route mortality rate of Late-run sockeye and will advise the Panel if changes to pre-season assumptions are warranted. Staff will not be able to provide stock-specific assessments for Cultus sockeye due to their low forecast abundance relative to much more abundant co-migrating stocks. Consequently, assessments of Cultus sockeye harvest impacts will rely on the use of other, more abundant Late-run stocks as indicators of their relative contribution to catches.

3. In-season assessment capabilities with respect to monitoring the run strength and migration timing of Late-run stocks in 2007 provide the opportunity for a flexible approach to management based on the combination of pre-season planning and in-season information. Thus, Canada has provided an escapement plan for all stock aggregates including the Late-run sockeye that varies total mortality rates with different levels of abundance. Escapement targets will also be modified based on Management Adjustments derived from Fraser River environmental conditions for Early Stuart, Early Summer-run and Summer-run stocks, and based on in-season estimates of upstream timing for Late-run stocks.

4. The pre-season fishing plan assumes an 8 day separation in the 50% marine migration timing (through Juan de Fuca Strait; Area 20) between Summer-run (August 8) and Late-run sockeye (August 16).

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[11] Late-run here refers to the Late-run timing group, excluding Birkenhead and a few minor miscellaneous sockeye stocks.

ADDITIONAL ELEMENT

- To help ensure that Late-run conservation objectives are achieved, in-season decisions regarding fisheries directed at Summer-run sockeye and Fraser River pink salmon will be constrained as necessary by potential harvest impacts on Late-run sockeye. Late-run sockeye catches will be estimated primarily with DNA stock identification methods.

APPENDIX E: 2007 FRASER PANEL MANAGEMENT PROCESS (final July 13, 2007)

The purpose of this document is to ensure that the Panel and Staff have a common understanding of the key factors relating to 2007 in-season management. These factors are summarized below in point form.

Sockeye Salmon

1. The 2007 management plan is similar in structure to recent past years, with fishing opportunities constrained by Early Summer-run sockeye early in the management season, and by conservation concerns for Late-run[12] stocks later in the season.

2. Start-up of fisheries is expected to occur in a similar manner to recent past years, through an evaluation of relative stock proportions, as well as escapement past Mission and cumulative migration abundance in marine assessment areas of Early Summer and Summer-run stocks. Of note, in 2007 relative to recent past years, the available data used to evaluate stock proportions and abundance prior to the start-up of fisheries may be diminished due to: i) expected low sample sizes for stock discrimination due to the effect of higher than average Fraser River discharges on river test fishery catch rates.; ii) delayed start-up of marine area test fisheries due to conservation concerns for Early Stuart sockeye.

3. Canada has provided an escapement plan (a schedule of total mortality rates at various return abundances) for all stock groups including Late-run. At the 50% p-level forecasts, the total allowable mortality for Early Summer, Summer and Late-run stocks is set at 60% of the total return (40% of the run is designated for spawning escapement). For Early Stuart sockeye the total allowable mortality is set to 0% effectively allocating the entire run for the spawning escapement. However, it is recognized that mortality will likely occur as a result of adverse river flows and a very small harvest is anticipated in test fisheries used to gather species and stock composition information. Management adjustments based on river conditions for Early Stuart, Early Summer and Summer run stocks and based on river entry timing for Late-run stocks may be adopted by the Panel to increase the likelihood that target escapements reach the spawning grounds. Available harvest for each sockeye management group will be allocated to various user groups as per international and domestic sharing arrangements, after subtractions are made for management adjustments, expected test fishing catch, and for Fraser River aboriginal exemptions. In addition, Canada will manage domestic fisheries not to exceed an exploitation rate limit of 20 % for Cultus sockeye in recognition of that stock's poor status.

4. Late-run sockeye are forecast to comprise approximately 25% of the Fraser River sockeye return in 2007. The Late-run abundance is large enough to possibly provide the opportunity to update Late-run timing and abundance during the period of active in-season sockeye management. In addition, the PSC staff has developed models to predict the in-river migration timing and associated en route mortality of Late-run sockeye and will advise the Panel if changes to pre-season management adjustments are warranted. If in-season predictions indicate an upstream timing of September 5 or earlier, the Late-run MA will be based on the average of 37% and the prediction from the Management Adjustment model using 2006-2007 cycle line data(but excluding the 2006 data point). If the in-season predictions indicate an upstream timing later than September 5th, the Late-run MA will be calculated using the Management Adjustment model only. This will enable the Panel to assess the measured catch and escapement of Late-run stocks relative to expected levels based on the escapement plan and both pre-season and in-season assumptions of run timing and abundance.

5. However, staff will not be able to provide unique assessments for Cultus sockeye due to the low relative abundance of this stock and associated inability to estimate its stock proportions accurately in mixed stock samples. The exploitation rate (based on all catches downstream of the confluence of the Vedder and Fraser Rivers) of all Late-run stocks excluding Harrison will be used as a surrogate for Cultus exploitation rate. This method assumes that Cultus sockeye have similar timing as the other Late-run stocks and thus will have similar vulnerability to

[12] Late-run here refers to the Late-run timing group, excluding Birkenhead and a few minor miscellaneous sockeye stocks.

fisheries. Available data are insufficient to reject this assumption. Furthermore, this assumption is consistent with methods used to apportion catches in historical data that have been used to estimate past productivity and evaluate future Cultus sockeye recovery options.

6. The Panel has agreed to use a catch limit approach to evaluate Late-run impacts during the 2006 management season. For the Late-run aggregate, this catch limit will be interpreted as the available TAC, taking into account any in-season changes to abundance and/or management adjustments. For Cultus sockeye, the catch limit that applies to Canada's domestic fisheries will be determined as 20% of the total Late-run excluding Harrison. The catch limit associated with the 20% exploitation rate limit will change in-season depending on the best estimates of Late-run abundance (excluding Harrison). The Panel has agreed to use DNA based stock identification techniques to estimate Late-run stock proportions and apply those estimates to catches to track Late-run impacts relative to the objectives.

Pink Salmon

1. Canada has provided an escapement goal of 6 million pink salmon at the 50% probability level forecast of 19,570,000 fish.
2. The 2007 management plan is similar in structure to recent past years, with pink salmon fishing opportunities constrained by conservation concerns for Late-run sockeye stocks until later in the season after the majority of Late-run sockeye have cleared marine waters.

APPENDIX F: 2007 REGULATIONS

The Fraser River Panel approved regulations for the management of the Fraser River sockeye and pink salmon fishery in Panel Area waters and submitted these to the Pacific Salmon Commission. The Commission approved the Fishery Regime and Regulations and submitted these to the respective national governments for approval on June 18, 2007.

Canadian Fraser River Panel Area

In accordance with Article VI, Paragraph 5 of the Pacific Salmon Treaty, the Commission recommends to the Canadian Government the adoption of the following Fishing Regime developed by the Fraser River Panel, namely:

1. a) No person shall commercially fish for sockeye or pink salmon in Pacific Fishery Management Area 20-1, 3 and 4 with nets from the 1st day of July, 2007, to the 15th day of September, 2007, both dates inclusive.

   b) No person shall troll commercially for sockeye or pink salmon in Pacific Fishery Management Area 20-1, 3 and 4 from the 1st day of July, 2007, to the 15th day of September, 2007, both dates inclusive.

2. a) No person shall commercially fish for sockeye or pink salmon in Pacific Fishery Management Areas 17 and 18 with nets from the 1st day of July, 2007, to the 29th day of September, 2007, both dates inclusive.

   b) No person shall troll commercially for sockeye or pink salmon in Pacific Fishery Management Area 18-1, 4 and 11 from the 1st day of July, 2007, to the 29th day of September, 2007, both dates inclusive.

3. a) No person shall commercially fish for sockeye or pink salmon with nets in Pacific Fishery Management Area 29 from the 1st day of July, 2007, to the 13th day of October, 2007, both dates inclusive.

   b) No person shall troll commercially for sockeye or pink salmon in Pacific Fishery Management Area 29 from the 1st day of July, 2007, to the 13th day of October, 2007, both dates inclusive.

4. The following Fraser River Panel Area waters are excluded:

   a) High Seas westerly of the Bonilla Point-Tatoosh Island Lighthouse Line.

   b) Pacific Fishery Management Area 19, Area 20-2 and 5 to 7 and Area 29-8.

   c) Commercial troll fishing in Pacific Fishery Management Area 17, Area 18-2, 3 and 5 to 10.

During the 2007 season, the Fraser River Panel will adopt Orders establishing open fishing periods based on a 2007 Management Plan adopted by the Panel. This Plan will be designed to achieve Pacific Salmon Treaty-mandated conservation objectives, international allocations of the catch, and domestic goals of the Parties.

United States Fraser River Panel Area

In accordance with Article VI, Paragraph 5 of the Pacific Salmon Treaty, the Commission recommends to the United States Government the adoption of the following Fishing Regime developed by the Fraser River Panel, namely:

Treaty Indian Fisheries:

1. No Treaty Indian shall commercially fish for sockeye or pink salmon in Puget Sound Salmon Management and Catch Reporting Areas 4B, 5 and 6C with drift gillnets or purse seines from the 1st day of July, 2007 to the 15th day of September, 2007, both dates inclusive.

2. No Treaty Indian shall commercially fish for sockeye or pink salmon in Puget Sound Salmon Management and Catch Reporting Areas 6, 6A, 7 and 7A with nets from the 1st day of July, 2007, to the 29th day of September, 2007, both dates inclusive.

3. No Treaty Indian shall commercially fish for sockeye or pink salmon with nets in that portion of Puget Sound Salmon Management and Catch Reporting Area 7A lying westerly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia from the 30th day of September, 2007, to the 7th day of October, 2007, both dates inclusive.

All Citizen Fisheries:

1. No person shall fish for sockeye or pink salmon in Puget Sound Salmon Management and Catch Reporting Areas 4B, 5, and 6C with nets from the 1st day of July, 2007, to the 15th day of September, 2007, both dates inclusive.

2. No person shall fish for sockeye or pink salmon in Puget Sound Salmon Management and Catch Reporting Areas 6, 6A, 7 and 7A with nets from the 1st day of July, 2007, to the 29th day of September, 2007, both dates inclusive.

3. No person shall fish for sockeye or pink salmon with nets in that portion of Puget Sound Salmon Management and Catch Reporting Area 7A lying westerly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia from the 30th day of September, 2007, to the 7th day of October, 2007, both dates inclusive.

The following Fraser River Panel Area waters and fisheries are excluded:

Treaty Indian and All Citizen Fisheries:

1. High Seas westerly of the Bonilla Point-Tatoosh Island Lighthouse Line.

2. Puget Sound Salmon Management and Catch Reporting Areas 6B, 6D, 7B, 7C, 7D and 7E.

During the 2007 season, the Fraser River Panel will adopt Orders establishing open fishing periods based on a 2007 Management Plan adopted by the Panel. This Plan will be designed to achieve Pacific Salmon Treaty-mandated conservation objectives, international allocations of the catch, and domestic goals of the Parties.

APPENDIX G: 2007 FRASER RIVER PANEL IN-SEASON ORDERS

To provide for adequate escapement of the various stocks of Fraser River sockeye and pink salmon and for the prescribed allocation of catch: (a) internationally, between the United States and Canada and (b) domestically, among the commercial user groups in Canada and the United States, the Fraser River Panel formulated the following orders to regulate Panel Area fisheries in 2007.

August 21, 2007

United States

Treaty Indian Fishery

Areas 4B, 5 and 6C

Open to drift gillnets for pink salmon from 12:00 p.m. (noon), Thursday, August 23, 2007, to 12:00 p.m. (noon) Saturday, August 25, 2007.

All Citizen Fishery

Areas 7 and 7A

Open to reefnets for pink salmon with non-retention of sockeye from 5:00 a.m. to 9:00 p.m. Thursday, August 23, 2007, 5:00 a.m. to 9:00 p.m. Friday, August 24, 2007 and from 5:00 a.m. to 12:00 p.m. (noon) Saturday, August 25, 2007.

August 24, 2007

United States

Treaty Indian Fishery

Areas 4B, 5 and 6C

Extended for drift gillnets for pink salmon from 12:00 p.m. (noon), Saturday, August 25, 2007 to 12:00 p.m. (noon) Wednesday, August 29, 2007.

Areas 6, 7, and 7A

Open to net fishing for pink salmon from 5:00 a.m., Sunday, August 26, 2007 to 9:00 p.m. Monday, August 27, 2007 southerly and easterly of a straight line drawn from the Iwersen's Dock on Point Roberts in the State of Washington to the Georgina Point Light at the entrance to Active Pass in the Province of British Columbia.

All Citizen Fishery

Areas 7 and 7A

Open to gillnets for pink salmon with non-retention of sockeye salmon from 8:00 a.m. to 11:59 p.m. (midnight) Tuesday, August 28, 2007 southerly and easterly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia.

Areas 7 and 7A

Open to purse seines for pink salmon with non-retention of sockeye salmon from 5:00 a.m. to 9:00 p.m. Tuesday, August 28, 2007 southerly and easterly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia.

Areas 7 and 7A

Extended for reefnets for pink salmon with non-retention of sockeye salmon from 12:00 p.m.(noon) Saturday, August 25, 2007 to 9:00 p.m. Saturday, August 25, 2007 and open from 5:00 a.m. to 9:00 p.m. Sunday, August 26, 2007 and from 5:00 a.m. to 9:00 p.m. Tuesday, August 28, 2007 southerly and easterly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia.

August 28, 2007

United States

Treaty Indian Fishery

Areas 4B, 5 and 6C

Extended for drift gillnets for pink salmon from 12:00 p.m. (noon) Wednesday, August 29, 2007 to 12:00 p.m. (noon) Saturday, September 1, 2007.

Areas 6, 7, and 7A

Open to net fishing for pink salmon from 5:00 a.m., Thursday, August 30, 2007 to 9:00 p.m. Friday, August 31, 2007 southerly and easterly of a straight line drawn from the Iwersen's Dock on Point Roberts in the State of Washington to the Georgina Point Light at the entrance to Active Pass in the Province of British Columbia.

All Citizen Fishery

Areas 7 and 7A

Open to gillnets for pink salmon with non-retention of sockeye salmon from 8:00 a.m. to 11:59 p.m. (midnight) Wednesday, August 29, 2007 southerly and easterly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia.

Areas 7 and 7A

Open to purse seines for pink salmon with non-retention of sockeye salmon from 5:00 a.m. to 9:00 p.m. Wednesday, August 29, 2007 southerly and easterly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia.

Areas 7 and 7A

Open for reefnets for pink salmon with non-retention of sockeye salmon from 5:00 a.m. to 9:00 p.m. Wednesday, August 29, 2007 southerly and easterly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia.

August 31, 2007

United States

Treaty Indian Fishery

Areas 4B, 5 and 6C

Extended for drift gillnets for pink salmon from 12:00 p.m. (noon) Saturday, September 1, 2007 to 12:00 p.m. (noon) Wednesday, September 5.

Areas 6, 7, and 7A

Open to net fishing for pink salmon from 5:00 a.m. Saturday, September 1, 2007 to 9:00 p.m. Monday, September 3, 2007 southerly and easterly of a straight line drawn from the Iwersen's Dock on Point Roberts in the State of Washington to the Georgina Point Light at the entrance to Active Pass in the Province of British Columbia.

All Citizen Fishery

Areas 7 and 7A

Open to gillnets for pink salmon with non-retention of sockeye salmon from 8:00 a.m. to 11:59 p.m. (midnight) Saturday, September 1, 2007 and from 8:00 a.m. to 11:59 p.m. (midnight) Sunday, September 2, 2007 southerly and easterly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia.

Areas 7 and 7A

Open to purse seines for pink salmon with non-retention of sockeye salmon from 5:00 a.m. to 9:00 p.m. Saturday, September 1, 2007 and from 5:00 a.m. to 9:00 p.m. Sunday, September 2, 2007 southerly and easterly of a straight line

drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia.

Areas 7 and 7A

Open for reefnets for pink salmon with non-retention of sockeye salmon from 5:00 a.m. to 9:00 p.m. Saturday, September 1, 2007 and from 5:00 a.m. to 9:00 p.m. Sunday, September 2, 2007 and from 5:00 a.m. to 9:00 p.m. Monday, September 3, 2007 southerly and easterly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia.

September 3, 2007

Canada

Area 18-1, 18-4 and 18-11

Open to Area H troll for pink salmon with non-retention of sockeye salmon from 12:01 a.m., Tuesday, September 4, 2007, until further notice.

United States

Treaty Indian Fishery

Areas 4B, 5 and 6C

Extended for drift gillnets for pink salmon from 12:00 p.m. (noon) Wednesday, September 5, 2007 to 12:00 p.m. (noon) Thursday, September 6, 2007.

Areas 6, 7, and 7A

Extended for net fishing for pink salmon from 9:00 p.m., Monday, September 3, 2007 to 9:00 p.m. Wednesday, September 5, 2007 southerly and easterly of a straight line drawn from the Iwersen's Dock on Point Roberts in the State of Washington to the Georgina Point Light at the entrance to Active Pass in the Province of British Columbia.

All Citizen Fishery

Areas 7 and 7A

Open to gillnets for pink salmon with non-retention of sockeye salmon from 8:00 a.m. to 11:59 p.m. (midnight) Tuesday, September 4, 2007 and from 8:00 a.m. to 11:59 p.m. (midnight) Wednesday, September 5, 2007 southerly and easterly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia.

Areas 7 and 7A

Open to purse seines for pink salmon with non-retention of sockeye salmon from 5:00 a.m. to 9:00 p.m. Tuesday, September 4, 2007 and from 5:00 a.m. to 9:00 p.m. Wednesday, September 5, 2007 southerly and easterly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia.

Areas 7 and 7A

Open for reefnets for pink salmon with non-retention of sockeye from 5:00 a.m. to 9:00 p.m. Tuesday, September 4, 2007 and from 5:00 a.m. to 9:00 p.m. Wednesday, September 5, 2007 southerly and easterly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia.

September 5, 2007

United States

Treaty Indian Fishery

Areas 4B, 5 and 6C

Extended for drift gillnets for pink salmon from 12:00 p.m. (noon) Thursday, September 6, 2007 to 12:00 p.m. (noon) Saturday, September 8, 2007.

Areas 6, 7, and 7A

Extended for net fishing for pink salmon from 9:00 p.m., Wednesday, September 5, 2007 to 9:00 p.m. Friday, September 7, 2007 southerly and easterly of a straight line drawn from the Iwersen's Dock on Point Roberts in the State of Washington to the Georgina Point Light at the entrance to Active Pass in the Province of British Columbia.

All Citizen Fishery

Areas 7 and 7A

Open to gillnets for pink salmon with non-retention of sockeye salmon from 8:00 a.m. to 11:59 p.m. (midnight) Thursday, September 6, 2007 and from 8:00 a.m. to 11:59 p.m. (midnight) Friday, September 7, 2007 southerly and easterly of a straight line drawn from the Iwersen's Dock on Point Roberts in the State of Washington to the Georgina Point Light at the entrance to Active Pass in the Province of British Columbia.

Areas 7 and 7A

Open to purse seines for pink salmon with non-retention of sockeye salmon from 5:00 a.m. to 9:00 p.m. Thursday, September 6, and from 5:00 a.m. to 9:00 p.m. Friday, September 7, 2007 southerly and easterly of a straight line drawn from the Iwersen's Dock on Point Roberts in the State of Washington to the Georgina Point Light at the entrance to Active Pass in the Province of British Columbia.

Areas 7 and 7A

Open for reefnets for pink salmon with non-retention of sockeye salmon from 5:00 a.m. to 9:00 p.m. Thursday, September 6, and from 5:00 a.m. to 9:00 p.m. Friday, September 7, 2007 southerly and easterly of a straight line drawn from the Iwersen's Dock on Point Roberts in the State of Washington to the Georgina Point Light at the entrance to Active Pass in the Province of British Columbia.

September 7, 2007

Canada

Area 18-1, 18-4 and 18-11

Closes to Area H troll for pink salmon with non-retention of sockeye salmon at 11:59 p.m., Friday, September 7, 2007.

Area 20

Relinquish regulatory control effective 12:01 a.m., Saturday, September 8, 2007.

United States

Areas 4B, 5, 6C

Relinquish regulatory control effective 12:01 p.m. (noon), Saturday, September 8, 2007.

Treaty Indian Fishery

Areas 6, 7, and 7A

Extended for net fishing for pink salmon from 9:00 p.m., Friday, September 7, 2007 to 9:00 p.m. Monday, September 10, 2007 southerly and easterly of a straight line drawn from the Iwersen's Dock on Point Roberts in the State of Washington to the Georgina Point Light at the entrance to Active Pass in the Province of British Columbia.

All Citizen Fishery

Areas 7 and 7A

Open to gillnets for pink salmon with non-retention of sockeye salmon from 8:00 a.m. to 11:59 p.m. (midnight) Monday, September 10, 2007 southerly and easterly of a straight line drawn from the Iwersen's Dock on Point Roberts in the State of Washington to the Georgina Point Light at the entrance to Active Pass in the Province of British Columbia.

Areas 7 and 7A

Open to purse seines for pink salmon with non-retention of sockeye salmon from 5:00 a.m. to 9:00 p.m. Monday, September 10, 2007 southerly and easterly of a straight line drawn from the Iwersen's Dock on Point Roberts in the State of Washington to the Georgina Point Light at the entrance to Active Pass in the Province of British Columbia.

Areas 7 and 7A

Open for reefnets for pink salmon with non-retention of sockeye salmon from 5:00 a.m. to 9:00 p.m. Saturday, September 8, 2007, 5:00 a.m. to 9:00 p.m. Sunday, September 9, 2007, and from 5:00 a.m. to 9:00 p.m. Monday, September 10, 2007 southerly and easterly of a straight line drawn from the Iwersen's Dock on Point Roberts in the State of Washington to the Georgina Point Light at the entrance to Active Pass in the Province of British Columbia.

September 10, 2007

United States

All Citizen Fishery

Areas 7 and 7A

Open for reefnets for pink salmon with non-retention of sockeye salmon from 5:00 a.m. to 9:00 p.m. Tuesday, September 11, 2007, 5:00 a.m. to 9:00 p.m. Wednesday, September 12, 2007, 5:00 a.m. to 9:00 p.m. Thursday, September 13, 2007 and from 5:00 a.m. to 9:00 p.m. Friday, September 14, 2007.

September 14, 2007

United States

All Citizen Fishery

Areas 7 and 7A

Open for reefnets for pink salmon with non-retention of sockeye salmon from 5:00 a.m. to 9:00 p.m. Saturday, September 15, 2007, 5:00 a.m. to 9:00 p.m. Sunday, September 16, 2007, 5:00 a.m. to 9:00 p.m. Monday, September 17, 2007, 5:00 a.m. to 9:00 p.m. Tuesday, September 18, 2007, 5:00 a.m. to 9:00 p.m. Wednesday, September 19, 2007, and 5:00 a.m. to 9:00 p.m. Thursday, September 20, 2007.

September 19, 2007

Canada

Areas 17 and 18

Relinquish regulatory control effective 12:01 a.m., Friday, September 21, 2007.

United States

Areas 6, 6A, 7 and 7A and that portion of Puget Sound Salmon Management and Catch Reporting Area 7A lying westerly of a straight line drawn from the low water range marker in Boundary Bay on the International Boundary through the east tip of Point Roberts in the State of Washington to the East Point Light on Saturna Island in the Province of British Columbia

Relinquish regulatory control effective 12:01 a.m., Friday, September 21, 2007.

Fraser River Panel control of Panel Areas was relinquished as follows:

- Canada: Area 20 on September 8; Areas 17 and 18 on September 21; and Area 29 on October 13.
- United States: Areas 4B, 5 and 6C on September 8; Areas 6, 6A, 7 and 7A (including the remaining portions of Area 7A near Point Roberts) on September 21.

APPENDIX H: PSC STOCK MONITORING, IDENTIFICATION AND ASSESSMENT PROGRAMS

Stock Monitoring

Stock monitoring programs monitor and assess the abundance and migration timing of Fraser River sockeye and pink salmon at different points along their migration route. In conjunction with stock composition information from the Stock Identification Group, the Stock Monitoring Group uses test fishery data from marine and freshwater areas, hydro-acoustic abundance estimates collected in the Fraser River at Mission, B.C., and visual observations at Hells Gate. In addition to providing estimates of daily and cumulative passage in marine areas and at Mission, stock monitoring analyses provide projections of the number of fish migrating between marine areas and Mission, and estimates of diversion through Johnstone Strait. This information is required for the development of fishing plans that aid in meeting spawning escapement and catch allocation objectives.

The migrations of Fraser sockeye and pink salmon through marine areas are tracked primarily through commercial, test and First Nations fisheries in marine areas, beginning in Juan de Fuca and Johnstone Straits and extending to the mouth of the Fraser River. Information about upstream migration in the Fraser River is obtained from the Mission hydroacoustic program, lower river gillnet test fisheries, visual observations at Hells Gate and analysis of catches in Fraser River First Nations fisheries. Between July 9 and September 20, estimates of Mission sockeye escapements by stock group were derived by applying species composition data to the hydroacoustic estimates. Prior to July 9 and after September 20, upstream passage was monitored solely using Whonnock (Area 29-16) test fishery data. Daily observations at Hells Gate between July 2 and September 28 provided qualitative information on the success of upstream fish passage and abundance.

A. Test Fishing

Commercial fisheries historically provided much of the data used to assess abundance and migration timing. Limited commercial fishing in recent years, however, has reduced the availability of this information. PSC staff therefore rely heavily on test fisheries to obtain abundance-related data such as catch and catch-per-unit-effort (CPUE), and biological samples from which stock composition estimates are derived. While Table 5 in the main body of the report describes when test fisheries were conducted, Table 1 below summarizes more detailed information about the type of nets and sampling strategy used.

Table 1. Sampling details about test fisheries conducted in 2007.

Area	Location	Gear	Number of Vessels	Net Length (m)	Net Depth (meshes)	Mesh Size (mm)	Mesh Size (in)	Number of Sets	Set Duration (minutes)
Canadian Panel Areas									
20	Juan de Fuca Str.	Gillnet	2	547	90	130	5 1/8	2	300
20	Juan de Fuca Str.	Purse Seine	1	547	875	95	3 3/4	6	20
29-14	Cottonwood	Gillnet	1	292	Variable	Variable		2	30
29-16	Whonnock	Gillnet	1	319	Variable	Variable		2	20
29-16	Mission	Gillnet	1	300	60	133	5 1/4	2	20
United States Panel Areas									
5	Juan de Fuca Str.	Gillnet	1	803	220	130	5 1/8	2	400
7	San Juan Islands	Reefnet [1]	3	n/a	n/a	n/a		n/a	n/a
Canadian Non-Panel Areas									
12	Round I. (Queen Charlotte Str.)	Gillnet	1-2	365	60-90	130	5 1/8	4	100
12	Blinkhorn (Johnstone Str.)	Purse Seine	1-2	401	575	95	3 3/4	6	20
13	Lower Johnstone Str.	Purse Seine	1-2	401	575	95	3 3/4	6	20

1 Reefnet observations are made during periods of favorable tides. Fish are counted as they swim through the gear, but are not harvested.

Information about the migration of sockeye and pink salmon through marine areas is provided primarily by test fisheries in Area 20 (Juan de Fuca Strait) and Areas 12 and 13 (Johnstone Strait), but is augmented during the early part of the season by test fisheries in U.S. Areas 5 (Juan de Fuca Strait) and 7 (San Juan Islands). The total return of Fraser River pink salmon is derived from CPUE indices from purse seine test fisheries in Area 20 and Area 12 together with estimates of stock identification and historical catchability estimates. Test fisheries in the Fraser River (Area 29) are used to assess species and stock composition for application to Mission passage estimates, but also provide abundance estimates through the use of CPUE models when the Mission hydroacoustic program is not active or when the presence of pink salmon confounds the making of hydroacoustic-based sockeye estimates at Mission.

As an outcome of problems with in-river species composition estimates encountered in 2005, when pink salmon proportions in 2007 began to increase, marine estimates of species composition were applied to Mission data to estimate sockeye and pink passage. Later, when the abundance of pink salmon increased to the point where Mission hydroacoustic estimates of sockeye abundance were not possible, sockeye abundance was estimated by use of marine test fishing CPUEs and in-season expansion lines. Also in 2007, a new gillnet test fishery was conducted near the Mission hydroacoustic site to investigate possible improvements to the estimation of species composition.

i. Seal Deterrent Study

The incidence of seals removing fish from in-river test fishery nets has increased dramatically in recent years, to the point where it is difficult to obtain enough biological samples to provide for species and stock identification. To illustrate, Figure 1 shows how the catchability '*q*' (i.e., fraction of a fish stock caught by a defined unit of fishing effort) has declined over the years as the number of seals encountered per trip has increased. This problem has been especially difficult when sockeye abundance is low at the beginning of the season and in years such as 2007 when the overall abundance was very low.

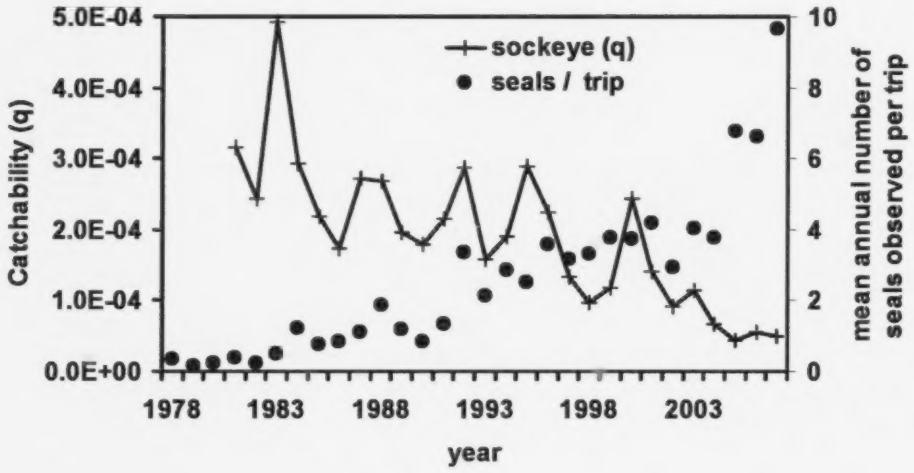

Figure 1. Annual mean sockeye catchability for the Cottonwood gillnet test fishery and annual mean number of seals observed per test fishing trip.

In an effort to reduce the impact of this problem, the PSC initiated research into the feasibility of using low voltage electrical gradients to deter seals from removing fish from nets, and thereby to increase both the number of fish landed and sample sizes in test fisheries. This project [13] was

[13] Forrest, K.W, Cave, J.D., Michielsens, C.G.J., Haulena, M. and Smith, D.V. 2009. Evaluation of an electric gradient to deter seal predation on salmon caught in gill-net test fisheries. North American Journal of Fisheries Management 29(4):885-894.

conducted in partnership with DFO, the Vancouver Aquarium and Smith-Root Inc., and funded by the Southern Endowment Fund. In 2007, experiments at the Vancouver Aquarium established that electric fields would repel but not harm seals. In a second phase of the study, an electric field generated across the Puntledge River (Vancouver Island) was shown to prevent seals from moving upriver to a feeding site where they prey on juvenile salmon. A third phase tested a prototype fishing net with an electric field surrounding half of the net in the Fraser River. The result of this experiment was that the catch and CPUE of sockeye and pink salmon in the section of net with an electric field was significantly larger than in the control section that did not have an electric field (Figure 2). Thus, fishing nets outfitted with electric field generators appear to be a potentially useful tool for maintaining test fishery sample sizes without harming seals. More research is required before implementation, however.

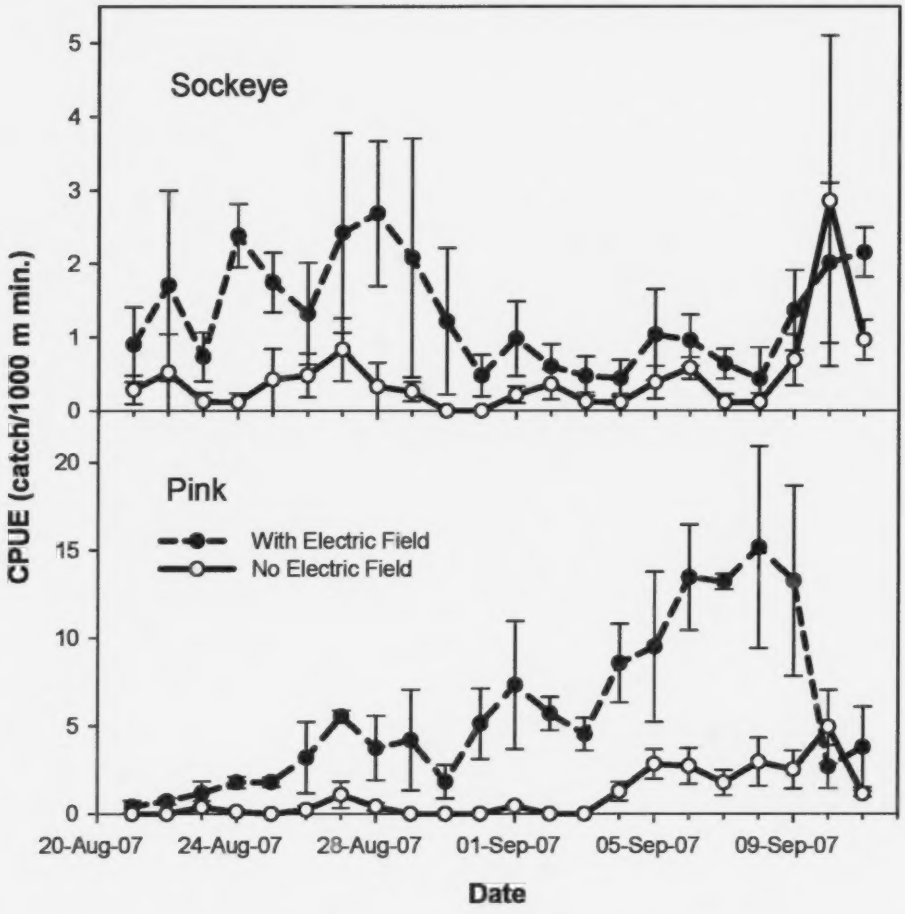

Figure 2. Daily average sockeye and pink salmon catch per unit effort (CPUE) and standard error bars (SE) for the Cottonwood gillnet test fishery, showing CPUEs for the net sections with electric fields versus the sections without electric fields).

B. Mission Hydroacoustics

PSC Staff have operated a hydroacoustic facility on the Fraser River near the Mission Bridge since 1977, for the purpose of providing timely in-season estimates of sockeye and pink salmon escapement through the lower river. This program has benefited from improved technologies and research in recent years [14, 15]. Daily abundance at Mission is estimated using a split-beam hydroacoustic system on the south shore (i.e., "left bank") of the Fraser River, combined with a split-beam system mounted on a vessel that runs back and forth across the river. Both of these systems operate 24-hrs a day and provide information about target density, fish behaviour, vessel speed and transducer placement. Additional work was focused on gathering independent diagnostic information (e.g., using a DIDSON hydroacoustic system) to verify assumptions used in the estimation procedure.

Daily estimates of fish abundance past Mission are produced by combining estimates from shore-based and vessel-based sonar systems. The shore-based system consists of two side-looking split-beam elliptical transducers (2°×10° and 4°×10°) attached to a rotator to control pan and tilt, and an attitude sensor to verify the transducers aim. An extensible fish-deflection weir prevented fish from swimming in acoustic blind zones (behind or too close to the transducers), and also increased the duration for which they were insonified. This ensured adequate numbers of echoes for tracking individual fish, particularly pink salmon which typically migrate close to shore. Transducer aims were optimized to reduce the non-sampled areas where migratory abundance must be estimated by extrapolation.

The vessel-based system transected the river every five minutes to obtain target density information using a downward looking split-beam circular transducer (15°). This system was also used to collect direction and speed of travel information during nine stationary sampling periods conducted daily at regular intervals, with three periods each at sampling stations in the south, north and centre of the channel. GPS (Global Positioning System) information was incorporated in these data.

Traces of individual fish as they passed through the sound-beam were acquired by analyzing the echo data from both shore and vessel-based systems using an alpha-beta tracker [16, 17]. The resulting trace data (i.e., "tracks") were then classified as fish or noise (debris, entrained air bubbles) using statistical methods [18] (i.e., discriminate function analysis). The integrity of the tracks were verified by trained staff, and unusual or atypical targets were identified and removed using graphical user interface (GUI) software. This was performed each day for all 24-hours and separately for both shore and vessel-based data. After these processing procedures were complete, the final fish track data were analyzed to produce statistics and daily summaries. Daily estimates of fish abundance were then obtained from a custom software program that used the processed shore and vessel-based data, and included calculations of sampling time, sampled area and fish passage through the un-sampled area. The resulting estimates of daily fish passage were sent to PSC office staff, where they were further analyzed to obtain Mission passage by species, with the sockeye component further apportioned into stock groups.

Also in 2007, a long range dual-frequency identification sonar (DIDSON-LR) and a side-looking split-beam system were operated independently on the north shore (i.e., "right-bank") of the river during the major sockeye and pink salmon escapement periods. Information from these

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[14] Xie, Y., A.P. Gray, F.J. Martens, and J.D. Cave. 2007. Development of a shore-based hydroacoustics system on the right bank of the Lower Fraser River to monitor salmon passages: A project report to Southern boundary restoration and enhancement fund. Pacific Salmon Commission, Vancouver, British Columbia. April, 2007.

[15] Xie, Y., C.G.J. Michielsens, A.P. Gray, F.J. Martens, and J.L. Boffey. 2008. Observations of avoidance reactions of migrating salmon to a mobile survey vessel in a riverine environment. Can. J. Fish. Aquat. Sci. 65: 2178-2190.

[16] Blackman, S.S. and R. Popoli. Design and Analysis of Modern Tracking Systems. Artech House, Boston, 1999.

[17] Xie, Y., A.P. Gray, F.J. Martens, J.L. Boffey and J.D. Cave. 2005. Use of dual-frequency identification sonar to verify salmon flux and to examine fish behaviour in the Fraser River. Pacific Salmon Comm. Tech. Rep. No. 16: 58 p. Vancouver, B.C.

[18] McLachlan, G.J. (1992). Discriminant Analysis and Statistical Pattern Recognition. Wiley, New York.

systems was analyzed post-season to verify that there were no significant discrepancies between cross-river abundance estimates from the current method versus a method that encompassed right-bank information. Sampling limitations of the DIDSON were identified, relating to the sampling area and ability to resolve targets at the far end of its range, with possible remedies to be tested in 2008.

Data were also collected using the traditional single-beam hydroacoustic system on the vessel that transected the river. Estimates using various combinations of single and split-beam data collected from the vessel were compared in post-season investigations. Estimates of right-bank fish passage for some time periods were also calculated using the DIDSON data. None of these comparisons indicated major bias issues with the 2007 abundance estimates.

i. Additional Hydroacoustic Studies

To help assess the effectiveness of a fish wheel operated by LGL under a Southern Endowment Fund grant, PSC staff deployed the DIDSON for a few hours near the fish wheel, located near the Mission Railway Bridge about 2 km downstream of the Mission hydroacoustic site. The DIDSON was positioned such that fish could be insonified and visualized as they approached the wheel from downstream. We observed the majority of the fish migrated in-shore of the fish wheel, and fish that did approach the fish wheel generally moved away from the baskets as they approached it.

Stock Identification

PSC staff conduct programs designed to identify the stock proportions of Fraser River sockeye and pink salmon in commercial, test and First Nations catches. These data provide information on the abundance and timing of sockeye and pink salmon as they migrate to their natal rivers in the Fraser River watershed. Stock identification data are also used to account for Fraser River sockeye and pink salmon wherever they may be caught, and to apportion the daily estimates of sockeye escapement past Mission into discrete stock groups. Stock identification methods for sockeye salmon in 2007 used DNA[19] and scale pattern analyses[20] from fish caught in marine and in-river fisheries. Stock identification for pink salmon in 2007 relied on DNA analyses, an improvement over the protein electrophoretic techniques that have been applied in recent years.

A. Sockeye Salmon

Analyses of samples from catches in commercial and test fisheries were conducted daily, beginning in late June and continuing through late September. Commission staff sampled test fishing catches and commercial sockeye landings at several sites in British Columbia and Washington (Vancouver, Port Renfrew, Nanaimo, Port Hardy, Quadra Island and Campbell River in British Columbia, and Bellingham and Sekiu in Washington). The Alaska Department of Fish and Game (ADF&G) collected samples for the PSC from District 104 purse seine landings in Ketchikan and Petersburg, whereas the PSC purchased services to obtain samples from District 104 landings in Prince Rupert. DFO provided samples from Johnstone Strait test fisheries and, in addition, DFO and First Nations personnel coordinated weekly scale sampling of Fraser River First Nations fisheries.

Proportions of Fraser River sockeye in District 104 purse seine fisheries were estimated primarily by comparing DNA samples to a coast wide baseline in 2007. This is in contrast to previous years which relied primarily on fish length and scale characteristics among four groups: Skeena, Nass, Alaska, and Fraser sockeye. This change was prompted by early signals of high Fraser River sockeye proportions in District 104 catches, by good catches there (771,000 fish) and lower than expected sockeye catches in PSC and DFO test fisheries, and by improved DNA baseline coverage around the Pacific Rim. Analysis of DNA permitted greater stock resolution

[19] Beacham, T.D., M. Lapointe, J.R. Candy, B. McIntosh, C. MacConnachie, A. Tabata, K. Kaukinen, L. Deng, K.M. Miller and R.E. Withler. 2004. Stock identification of Fraser River sockeye salmon using microsatellites and major histocompatibility complex variation. Trans. Am. Fish. Soc. 133: 1117-1137.

[20] Gable, J. and S. Cox-Rogers. Stock identification of Fraser River sockeye salmon: methodology and management application. PSC Tech. Rep. No. 5, October, 1993.

within the Fraser group and other components of the catch. Proportions of Fraser stocks in District 104 in 2007 differed from the relative production estimated for the overall return of Fraser sockeye. Approximately 9% of the total Fraser sockeye return was estimated to be caught in District 104, but the catch of Birkenhead sockeye in District 104 represented an especially strong proportion (23%) of its total return. These genotypes were scrutinized for signs of bias but no such signs were found. Discriminant function analysis was also performed on scale characteristics from District 104 samples, including the first three weeks of openings for which no DNA was sampled. Results were generally congruent for openings in which samples overlapped, but DNA results were used for final estimates when available: 139,000 Fraser River sockeye were caught from August 5 until the closure of the fishery.

Baselines for DNA analysis in other marine fisheries in 2007 were also more inclusive of non-Fraser stocks than in previous years. The low abundance of Fraser River sockeye in 2007 increased the frequency of non-Fraser fish in Areas 12 and 20 test fishery samples and resulted in anomalous results that seemed improved by expansion of the baseline.

B. Pink Salmon

From 1987 to 2005 protein electrophoretic analysis of allozymes in pink salmon tissues [21] was used to estimate the contribution of Fraser River pink salmon in mixed-stock fisheries, primarily in areas south of Cape Caution. Most of these electrophoretic analyses were conducted by the Genetics Unit at the Washington Department of Fish and Wildlife. In 2005, research was accelerated on a new genetic stock identification (GSI) technique for pink salmon that would potentially provide improved accuracy.

In 2006, the Molecular Genetics Laboratory at the Pacific Biological Station in Nanaimo was contracted by the PSC to analyze pink salmon tissue samples collected from numerous spawning grounds in B.C. and Washington. A preliminary pink salmon microsatellite DNA baseline was assembled in early 2007 with 14 microsatellite DNA loci. Simulation analyses indicated that estimates of Fraser River pink salmon contributions in mixed-stock fisheries were sufficiently accurate for in-season application.

GSI analyses can apportion mixed-stock samples into three components - Fraser, Canada South Coast (excluding Fraser) and Washington. The ability to accomplish this is based on a database of genetic information (i.e., baseline) from numerous stocks from each region. In 2007, the baseline was composed of 28 pink salmon stocks from three regions, as follows: (1) Fraser River – Fraser River mainstem, Vedder, Harrison, Coquihalla, Thompson, Seton and Bridge stocks; (2) Canada South Coast (Non-Fraser) – Quatse, Cluxewe, Wakeman, Adam, Kakweiken, Glendale, Heydon, Quinsam, Puntledge, Squamish and Indian stocks; and (3) Washington – Nooksack, Skagit, Stillaguamish, Snohomish, Green, Puyallup, Hamma Hamma, Duckabush, Dosewallips and Dungeness stocks. The stocks in this baseline represented a very high proportion of the pink salmon stocks that could potentially contribute to marine fishery catches where Fraser River pink salmon are typically harvested.

During the 2007 in-season management period, opercular tissue samples from 100 pink salmon were collected weekly from specific areas. After laboratory analysis of the tissue samples, the data were analyzed using a computer program (i.e., SPAM, or Statistical Program for Analyzing Mixtures) that was developed by the Alaska Department of Fish and Game. The model compares known genetic standards (i.e., baseline) to genetic data from samples of unknown stock composition (i.e., in-season mixed-stock fishery samples) and generates estimates of the most likely stock composition.

There were few commercial fisheries directed at Fraser River pink salmon in 2007, so only a small number of samples were required for GSI. Estimates derived from these samples were used primarily for assessing catch, migration route (diversion rate) and run size. GSI samples were collected in Canadian statistical Areas 12, 13 and 20, and United States Areas 7 and 7A from early August to early September.

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[21] White, B.A. 1996. Genetic stock identification of Fraser River pink salmon: Methodology and management application. Pacific Salmon Comm. Tech. Rep. No. 7: 44p.

Proportions of Fraser pinks in purse seine samples from Areas 12 and 13 increased from about 30% in early August to 80% by early September, and for Area 20 samples increased from 50% in early August to almost 90% by early September. In United States Areas 7 and 7A, the contribution of Fraser pinks averaged slightly over 80% from late August to early September. The pattern of generally high contributions of Fraser pink salmon relative to other co-migrating pink salmon stocks was consistent with observations in prior years.

The number of stocks represented in the DNA baseline will be expanded in the future to help increase the accuracy of GSI estimates of stock contributions. In addition, other statistical models for analyzing genetic data will be evaluated.

Stock Assessment

Assessment of total Fraser River sockeye abundance by stock group is primarily based on catch, effort, escapement and stock composition data. Commercial fishing was very restricted in 2007, so test fishing catch and CPUE data were used extensively for assessing abundance by stock group. These data are analysed using cumulative-normal, cumulative-passage-to-date and Bayesian models[22, 23]. The cumulative-normal model compares the reconstructed daily migration pattern to ideal run timing curves, assuming the run is normally distributed. The cumulative-passage model compares the total run observed up to a particular date in the past to the total abundance for those years. Based on the resulting regression equation and the in-season estimate of run-to-date, a total abundance estimate for the current year is obtained. The Bayesian model incorporates both models by using a similar comparison technique as the cumulative-normal model to compare the observed run to a hypothetical normally distributed run, and by using historical data to help inform the abundance in the current year. Theoretically the Bayesian model should provide more stable estimates since it relies on both in-season data as well as historical data.

To assess the abundance of Fraser River pink salmon, a purse seine test fishery maximum three-day CPUE model was used. This model used historical data to predict the annual abundance that would migrate through Juan de Fuca and Johnstone Straits separately, then summed the estimates to obtain a total estimate for Fraser pinks. Then, at the end of the season, an estimate for the entire season was provided through run reconstruction methods. The CPUE model is becoming increasingly uncertain with each additional year because the absence of direct pink salmon spawning estimates since 2001 has required that in-season run reconstruction estimates substitute for the true run size.

[22] Pacific Salmon Commission. 1995. Pacific Salmon Commission run-size estimation procedures: An analysis of the 1994 shortfall in escapement of Late-run Fraser River sockeye salmon. Pacific Salmon Comm. Tech. Rep. No. 6: 179 p.

[23] Pacific Salmon Commission. 1998. Report of the Fraser River Panel to the Pacific Salmon Commission on the 1995 Fraser River sockeye and pink salmon fishing season. Vancouver, B.C., 64 p.

APPENDIX I: HISTORICAL CATCH, ESCAPEMENT AND PRODUCTION DATA, AND DETAILED 2007 TAC CALCULATION

Table 1. Catch by user group, spawning escapement, run-size adjustment and abundance of Fraser River sockeye salmon for cycle years 1995-2007.

	Fraser Sockeye Salmon			
	1995	1999	2003	2007
CANADIAN CATCH				
Panel Area	257,000	1,000	266,000	0
Non-Panel Areas	542,000	48,000	770,000	0
Commercial Catch	**799,000**	**49,000**	**1,036,000**	**0**
Marine FSC	32,000	95,000	218,000	43,000
Fraser River FSC	776,000	252,000	587,000	154,000
Economic Opportunity	0	0	0	0
First Nations Catch	**808,000**	**347,000**	**805,000**	**197,000**
Marine Recreational	6,000	2,000	3,000	200
Fraser Recreational	4,000	14,000	74,000	0
Charter	22,000	4,000	1,000	0
ESSR	0	6,000	10,000	2,100
Non-commercial Catch	**32,000**	**26,000**	**88,000**	**2,300**
Canadian Total	**1,639,000**	**422,000**	**1,929,000**	**199,000**
UNITED STATES CATCH				
Treaty Indian	242,000	20,000	159,000	0
All Citizen	168,000	0	84,000	0
Commercial catch	**410,000**	**20,000**	**243,000**	**0**
Ceremonial	0	0	0	3,400
Recreational	0	0	0	0
Non-commercial Catch	**0**	**0**	**0**	**3,400**
Washington Total	410,000	20,000	243,000	3,400
Alaska	23,000	21,000	68,000	139,000
United States Total	**433,000**	**41,000**	**311,000**	**142,000**
TEST FISHING CATCH				
Canada	58,000	53,000	40,000	13,000
United States	2,000	0	1,000	8,400
PSC (Panel Areas)	60,000	53,000	41,000	22,000
Canada (non-Panel Areas))	4,000	46,000	66,000	13,000
Test Fishing Total	**64,000**	**99,000**	**107,000**	**35,000**
TOTAL CATCH				
Total Catch in All Fisheries	2,136,000	562,000	2,347,000	376,000
Adult Spawning Escapement	1,731,000	1,833,000	1,979,000	887,000
Jack Spawning Escapement	20,000	2,000	9,000	1,900
Run-size Adjustment	0	1,246,000	563,000	245,000
Total Abundance	**3,887,000**	**3,643,000**	**4,898,000**	**1,510,000**
Total Catch in All Fisheries	55%	15%	48%	25%
Adult Spawning Escapement	45%	50%	40%	59%
Jack Spawning Escapement	1%	0%	0%	0%
Run-size Adjustment	0%	34%	11%	16%
Total Abundance	100%	100%	100%	100%

Table 2. Catch by user group, spawning escapement and abundance of Fraser River pink salmon for cycle years 2001-2007.

	Fraser Pink Salmon			
	2001	2003	2005	2007
CANADIAN CATCH				
Panel Area	15,000	28,000	1,100	0
Non-Panel Areas	742,000	805,000	124,000	1,900
Commercial Catch	**757,000**	**833,000**	**125,000**	**1,900**
Marine FSC	16,000	0	183,000	5,900
Fraser River FSC	2,500	20,000	54,000	12,000
Economic Opportunity	115,000	277,000	211,000	309,000
First Nations Catch	**133,000**	**296,000**	**448,000**	**327,000**
Marine Recreational	73,000	77,000	47,000	59,000
Fraser Recreational	1,300	9,400	17,000	18,000
Charter	2,300	200	0	0
ESSR	0	0	0	0
Non-commercial Catch	**76,000**	**87,000**	**64,000**	**77,000**
Canadian Total	**966,000**	**1,216,000**	**637,000**	**406,000**
UNITED STATES CATCH				
Treaty Indian	109,000	320,000	183,000	210,000
All Citizen	317,000	452,000	134,000	158,000
Commercial catch	**425,000**	**772,000**	**317,000**	**368,000**
Ceremonial	800	100	100	400
Recreational	18,000	39,000	21,000	27,000
Non-commercial Catch	**19,000**	**39,000**	**22,000**	**27,000**
Washington Total	444,000	811,000	338,000	395,000
Alaska	0	0	0	0
United States Total	**444,000**	**811,000**	**338,000**	**395,000**
TEST FISHING CATCH				
Canada	25,000	29,000	13,000	24,000
United States	0	0	500	1,600
Commission (Panel Areas)	25,000	29,000	14,000	25,000
Canada (non-Panel Areas))	13,000	14,000	71,000	14,000
Test Fishing Total	**37,000**	**42,000**	**85,000**	**39,000**
TOTAL CATCH				
Total Catch in All Fisheries	1,448,000	2,069,000	1,060,000	840,000
Adult Spawning Escapement	19,726,000	23,931,000	8,940,000	10,160,000
Total Abundance	**21,174,000**	**26,000,000**	**10,000,000**	**11,000,000**
Total Catch in All Fisheries	7%	8%	11%	8%
Adult Spawning Escapement	93%	92%	89%	92%
Total Abundance	100%	100%	100%	100%

Table 3. Catches of Fraser River sockeye salmon in Canadian First Nations fisheries by area for cycle years 1995-2007.*

Fishing Area	1995	1999	2003	2007
Fraser River Mainstem				
Below Port Mann	131,700	26,200	114,900	14,300
Port Mann to Mission	119,600	15,800	88,800	14,900
Mission to Hope	113,000	26,600	66,600	19,700
Hope to Sawmill Cr.	213,800	69,800	153,600	24,000
Sawmill Cr. to Kelly Cr.	155,400	72,800	114,000	56,500
Kelly Creek to Naver Cr.	6,900	8,700	5,100	2,700
Above Naver Cr.	2,100	3,300	2,200	4,100
Total	742,500	223,200	545,200	136,200
Tributaries				
Harrison/Lillooet System	n/a	n/a	n/a	n/a
Thompson System	3,100	2,600	8,700	2,000
Chilcotin System	19,200	19,800	29,600	11,700
Nechako System	3,900	3,000	0	3,000
Stuart System	7,400	3,800	3,400	1,100
Total	33,600	29,200	41,700	17,800
Total Fraser Catch	776,100	252,400	586,900	154,000
Marine Areas	31,800	95,100	217,500	42,900

* Data supplied by DFO.

Table 4. Catches of Fraser River pink salmon in Canadian First Nations fisheries by area for cycle years 2001-2007.*

Fishing Area	2001	2003	2005	2007
Fraser River Mainstem				
Below Port Mann	500	2,600	16,100	4,000
Port Mann to Mission	800	5,500	5,000	1,500
Mission to Hope	115,400	284,100	221,900	312,200
Hope to Sawmill Cr.	400	900	6,300	1,600
Sawmill Cr. to Kelly Cr.	0	0	14,500	1,300
Kelly Creek to Naver Cr.	0	0	0	0
Above Naver Cr.	0	0	0	0
Total	117,100	293,200	263,800	320,600
Tributaries				
Harrison/Lillooet System	0	0	0	0
Thompson System	0	0	400	100
Chilcotin System	0	0	0	200
Nechako System	0	0	0	0
Stuart System	0	0	0	0
Total	0	0	400	300
Total Fraser Catch	117,100	293,200	264,300	320,900
Marine Areas	16,000	0	182,500	5,900

* Data supplied by DFO.

Table 5. Escapements of sockeye salmon to Fraser River spawning areas for cycle years 1995-2007.

DISTRICT Run-timing Group Stream/Lake	1995	1999	2003	2007
NORTHEAST				
Upper Bowron R.	34,417	8,238	6,752	2,173
STUART				
Early Stuart				
Takla L. Streams	36,524	4,201	3,505	978
Middle R. Streams	59,421	16,009	7,553	3,733
Trembleur L. Streams	26,911	4,342	2,100	634
Late Stuart				
Middle R.	7,462	8,559	3,851	835
Tachie R.	22,368	44,273	26,899	4,499
Miscellaneous	4,532	8,742	5,897	3,153
NECHAKO				
Nadina R. (Late)	2,499	3,239	1,557	497
Nadina Channel	21,499	7,099	1,606	1,244
Stellako R.	122,676	138,137	78,093	41,328
QUESNEL				
Horsefly R.	164,276	133,942	155,564	55,919
Horsefly Channel	16,263	5,974	22,965	3,628
McKinley Cr.	380	846	3,748	628
Mitchell R.	35,190	46,451	90,779	9,880
Miscellaneous	0	2,147	6,114	5,045
CHILCOTIN				
Chilko R. & L.	536,048	891,567 *1*	608,321	305,853
Chilko Channel	8,316	-	- *1*	- *1*
SETON-ANDERSON				
Gates Cr.	7,181	88	880	0
Gates Channel	0	4,047	8,931	2,555
Portage Cr.	7,875	6,264	4,940	1,699
NORTH THOMPSON				
North Thompson R.	121	15	26,135	18,333
Raft R.	1,040	6,979	10,040	14,353
Fennell Cr.	11,245	5,697	9,087	11,212
Miscellaneous	0	0	0	0
SOUTH THOMPSON				
Early Summer-run				
Scotch Cr.	14,772	4,093	5,089	8,272
Seymour R.	48,746	18,895	31,345	9,979
Anstey R.	3,562	2,245	1,850	1,114
Eagle R.	1,890	2,581	2,012	4,729
Miscellaneous	2,148	1,358	1,454	697
Late-run				
Adams R.	405,075	333,761	371,306	54,729
Adams Channel	1,510	0	207	0
Lower Shuswap R.	12,330	6,788	5,641	5,103
Middle Shuswap R.	155	293	126	324
Miscellaneous	8,714	2,673	3,962	887
HARRISON-LILLOOET				
Birkenhead R.	39,871	48,916	309,878	93,480
Big Silver Cr.	1,513	742	10,962	4,784
Harrison R.	16,618	8,577	8,259	128,295
Weaver Cr.	12,863	13,520	14,452	10,969
Weaver Channel	20,262	21,114	35,036	26,331
LOWER FRASER				
Nahatlatch R. & L.	2,297	2,613	3,070	3,853
Cultus L.	10,316	12,392	1,939 *2*	538 *3*
Upper Pitt R.	5,500	35,961	78,229	41,829
Chilliwack L./Dolly Varden Cr.	968	424	4,956	1,965
MISCELLANEOUS *4*	2,091	1,456	3,915	926
ADULTS	1,737,445	1,865,258	1,979,005	886,983
JACKS	18,473	2,479	8,575	1,908
TOTAL NET ESCAPEMENT	1,755,918	1,867,737	1,987,580	888,891

* Estimates are from DFO.

1 Includes Chilko Channel up to 2002. The channel was decommissioned and removed in 2003.

2 Includes 245 sockeye removed for broodstock.

3 Includes 151 sockeye removed for broodstock.

4 Miscellaneous category includes fish from throughout the Fraser watershed.

Table 6. Fraser River pink salmon production for cycle (odd) years from 1961-2007.

Brood Year	Spawners		Potential Egg Deposition	Fry Production	Adult Returns (Catch + Escapement)		% Survival		Average To Date
	Total (millions)	Female (millions)	(millions)	(millions)	(millions)		Fresh Water	Marine	
1961	1.094	0.654	1,569	143.6	5.482		9.2%	3.8%	3.8%
1963	1.953	1.216	2,435	284.2	2.320		11.7%	0.8%	2.3%
1965	1.191	0.692	1,488	274.0	12.963		18.4%	4.7%	3.1%
1967	1.831	0.973	2,132	237.6	3.931		11.1%	1.7%	2.8%
1969	1.529	0.957	2,018	195.6	9.763		9.7%	5.0%	3.2%
1971	1.804	1.096	1,923	245.4	6.801		12.8%	2.8%	3.1%
1973	1.754	1.009	1,865	292.4	4.894		15.7%	1.7%	2.9%
1975	1.367	0.781	1,493	279.2	8.209		18.7%	2.9%	2.9%
1977	2.388	1.362	2,960	473.3	14.404		16.0%	3.0%	2.9%
1979	3.561	2.076	3,787	341.5	18.685		9.0%	5.5%	3.2%
1981	4.488	2.560	4,814	590.2	15.346		12.3%	2.6%	3.1%
1983	4.632	2.931	4,702	554.8	19.104		11.8%	3.4%	3.2%
1985	6.461	3.561	5,900	256.1	7.172		4.3%	2.8%	3.1%
1987	3.224	1.856	3,471	406.9	16.484		11.7%	4.1%	3.2%
1989	7.189	4.383	7,198	360.0	22.180		5.0%	6.2%	3.4%
1991	12.949	8.002	12,330	697.0	16.983		5.7%	2.4%	3.3%
1993	10.768	6.454	9,192	439.0	12.904		4.8%	2.9%	3.3%
1995	7.175	4.248	10,233	272.3	8.176		2.7%	3.0%	3.3%
1997	2.842	1.740	2,863	252.9	3.586		8.8%	1.4%	3.2%
1999	3.422	1.885	2,702	222.8	21.174		8.2%	9.5%	3.5%
2001	19.725	9.543	16,274	680.9	26.000	1	4.2%	3.8%	3.5%
2003	n/a	n/a	n/a	419.0	10.000	1	n/a	2.4%	3.5%
2005	n/a	n/a	n/a	614.7	11.000	1	n/a	1.8%	3.4%
2007	n/a	n/a	n/a	497.2					
Average	4.826	2.761	4,826	376.3	12.068		10.1%	3.4%	

1 Estimates of adult returns since 2003 (2001 brood year) are highly uncertain because pink salmon escapement enumeration programs were not conducted by DFO. Instead, estimates of adult returns for these years are based on in-season abundance estimates by the PSC.

Table 7. Detailed calculation of total allowable catch and international catch allocation for Fraser River sockeye salmon by management group in 2007. In-season estimates of abundance, spawning escapement target, management adjustment and test fishing catch at the time the Panel relinquished control of the last U.S. Panel Area (September 21) were used, according to the 2005 revised Annex IV of the Treaty.

TAC Calculations	Fraser Sockeye							Fraser Pinks	
xxx	Early Stuart	Early Summer	Summer	Birken -head	Late	Total			
RUN STATUS, ESCAPEMENT NEEDS & AVAILABLE SURPLUS									
In-season Abundance Estimate	**13,000**	**155,000**	**650,000**	**100,000**	**510,000**	**1,428,000**		**11,000,000**	
Spawning Escapement Target (SET)	**13,000**	**155,000**	**600,000**	**92,000**	**415,000**	**1,275,000**		**6,000,000**	
Management Adjustment (MA)	**14,000**	**34,000**	**0**	**0**	**328,000**	**376,000**		0	
Proportional MA (pMA)	1.06	0.2171	0	0	0.79			0	
Adjusted Spn. Esc. Target	13,000	155,000	600,000	92,000	510,000	1,370,000		6,000,000	
Test Fishing (TF)	**100**	**4,000**	**20,000**	**2,000**	**10,000**	**36,100**		**0**	
Surplus above Adjusted SET & TF	0	0	30,000	6,000	0	36,000		5,000,000	
DEDUCTIONS & TAC FOR INTERNATIONAL SHARING									
Aboriginal Fishery Exemption (AFE) *	**900**	**18,000**	**133,300**	**7,800**	**36,800**	**196,800**		**0**	
Total Deductions (Adj.SET+TF+AFE)	14,000	177,000	753,300	101,800	556,800	1,602,900		6,000,000	
Available TAC	**0**	**0**	**0**	**0**	**0**	**0**		**5,000,000**	
UNITED STATES (Washington) TAC									
Proportionally distributed TAC **	**0**	**0**	**0**	**0**	**0**	**0**	16.5%	**1,285,000**	25.7%
Washington Catch ***	0	200	700	600	1,800	3,400		395,100	7.9%
Deviation from propor. distrib.TAC	0	-200	-700	-600	-1,800	-3,400		889,900	
CANADA TAC									
Proportionally Distributed TAC	0	0	0	0	0	0	83.5%	3,715,000	74.3%
AFE	900	18,000	133,300	7,800	36,800	196,800		0	
Propor. distrib. TAC + AFE	**900**	**18,000**	**133,000**	**7,800**	**37,000**	**196,700**		**3,715,000**	
Canadian Catch excluding ESSR Catch	900	18,000	133,000	7,800	37,000	196,700		406,100	
Deviation from propor. distrib. TAC + AFE	0	0	0	0	0	0		3,308,900	
TOTAL									
Available TAC + AFE	**900**	**18,000**	**133,000**	**7,800**	**37,000**	**196,700**		**5,000,000**	
Total Catch	900	18,200	133,700	8,400	38,800	200,100		801,200	
Deviation from propor. distrib. TAC + AFE	0	-200	-700	-600	-1,800	-3,400		4,198,800	

* According to Annex IV of the Pacific Salmon Treaty, the agreed Fraser River Aboriginal Fishery Exemption is the actual catch of Fraser River sockeye harvested in both the in-river and marine area Aboriginal Fisheries, up to 400,000 sockeye annually.

** Washington sockeye share according to Annex IV of the Pacific Salmon Treaty.

*** Fraser sockeye caught in Washington were by-catch in pink salmon-directed Treaty Indian fisheries, and were used for Ceremonial and Subsistence purposes.

APPENDIX J: STAFF OF THE PACIFIC SALMON COMMISSION IN 2007

EXECUTIVE OFFICE

Don Kowal, Executive Secretary
Kimberly Bartlett, Secretary/Receptionist
Sandie Gibson, Information Technology Support Specialist
Kathy Mulholland, Information Technology Manager
Vicki Ryall, Meeting Planner
Teri Tarita, Records Administrator/Librarian

FINANCE AND ADMINISTRATION

Ken Medlock, Controller
Bonnie Dalziel, Accountant
Angus Mackay, Manager, Restoration & Enhancement Funds
Victor Keong, Program Assistant, Restoration & Enhancement Funds

FISHERIES MANAGEMENT DIVISION STAFF

Mike Lapointe, Chief Biologist

BIOMETRICS GROUP

Ian Guthrie, Head

STOCK IDENTIFICATION GROUP

Jim Gable, Head
Holly Anozie, Scale Lab Assistant
Steve Latham, Sockeye Stock Identification Biologist
Maxine Reichardt, Senior Scale Analyst
Julie Sellars, Assistant Scale Analyst
Zac Semeniuk, Resource Management Technician
Bruce White, Pink Stock Identification Biologist

STOCK MONITORING GROUP

Jim Cave, Head
Jacqueline Boffey, Hydroacoustic Technician (Term)
Keith Forrest, Test Fishing Biologist
Andrew Gray, Hydroacoustics Biologist
Fiona Martens, Hydroacoustic Technician
Yunbo Xie, Hydroacoustics Scientist

APPENDIX K: MEMBERSHIP OF THE FRASER RIVER PANEL TECHNICAL COMMITTEE IN 2007

2007 Technical Committee Members	
Canada	**United States**
L. Jantz, Co-Chair *Fisheries and Oceans Canada*	G. Graves, Co-Chair *Northwest Indian Fisheries Commissions*
A. Cass *Fisheries and Oceans Canada*	K. Adicks *Washington Department of Fish and Wildlife*
R. Goruk *Fisheries and Oceans Canada*	S. McAvinchey *National Marine Fisheries Service*
M. Staley *First Nations Advisor*	